MTNC030943A1

B05

Service Manual

Color Television

Simplified

CT-27SL13MG / CT-27SL13MUG / CT-27SL33MG / CT-27SL33MUG

NA10

This simplified service manual is issued to add listed models to the simplified service manual order No. MTNC030733A1 (CT-27SL33G). Models included in this simplified service manual are identical to the versions included on simplified service manualorder No. MTNC030733A1 (CT-27SL33G) except for the differences included in this simplied service manual. A difference parts list and unique schematics to these models are included in this simplified service manual. Please file and use this simplifiedservice manual together with the simplified service manual order No. MTNC030733A1 (CT-27SL33G).

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⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

Panasonic®

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are marked by ⚠ in the Schematic Diagrams, Circuit Board Diagrams, Exploded Views and Replacement Parts List. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire or other hazards. Do not modify the original design without permission of manufacturer.

1. Safety precautions

General guidelines

An isolation transformer should always be used during the servicing of a receiver whose chassis is not isolated from AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injuryfrom electrical shocks. It will also protect the receiver from being damaged by accidental shorting that may occur during servicing.

When servicing, observe the original lead dress, especially in the high voltage circuit. Replace all damaged parts (also parts that show signs of overheating.)

Always replace protective devices, such as fish paper, isolation resistors and capacitors, and shields after servicing the receiver. Use only manufacturer’s recommended rating for fuses, circuits breakers, etc.

High potentials are present when this receiver is operating. Operation of the receiver without the rear cover introduces danger for electrical shock. Servicing should not be performed by anyone who is not thoroughly familiar with the necessary precautionswhen servicing high voltage equipment.

Extreme care should be practiced when handling the picture tube. Rough handling may cause it to implode due to atmospheric pressure. (14.7 lbs per sq. in.). Do not nick or scratch the glass or subject it to any undue pressure. When handling, usesafety goggles and heavy gloves for

protection. Discharge the picture tube by shorting the anode to chassis ground (not to the cabinet or to other mounting hardware). When discharging connect cold ground (i.e. dag ground lead) to the anode with a wellinsulated wire or use a grounding probe.Avoid prolonged exposure at close range to unshielded areas of the picture tube to prevent exposure to x ray radiation.

The test picture tube used for servicing the chassis at the bench should incorporate safety glass and magnetic shielding. The safety glass provide shielding for the tube viewing area against x ray radiation as well as implosion. The magnetic shieldlimits the x ray radiation around the bell of the picture tube in addition to the restricting magnetic effects. When using a picture tube test jig for service, ensure that the jig is capable of handling 50kV without causing x ray radiation.

Before returning a serviced receiver to the owner, the service technician must thoroughly test the unit to ensure that is completely safe to operate. Do not use a line isolation transformer when testing.

Leakage current cold check

Unplug the A.C. cord and connect a jumper between the two plug prongs.Measure the resistance between the jumpered AC plug and expose metallic parts such as screwheads, antenna terminals, control shafts, etc. If the exposed metallic part has a returnpath to the chassis, the reading should be between 240k Ω and 5.2M Ω . If the exposed metallic part does not have a return path to the chassis, the reading should be infinite.

Leakage current hot check

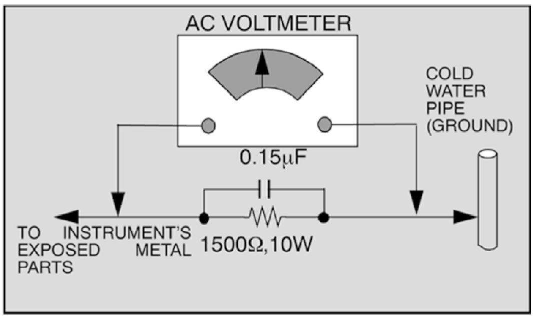
Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during the check.

Connect a 1.5k Ω 10 watt resistor in parallel with a 0.15 μ F capacitor between an exposed metallic part and ground. Use earth ground, for example a water pipe.

Using a DVM with a 1000 ohms/volt sensitivity or higher, measure the AC potential across the resistor.

Repeat the procedure and measure the voltage present with all other exposed metallic parts. Verify that any potential does not exceed 0.75 volt RMS. A leakage current tester (such a Simpson model 229, Sencore model PR57 or equivalent) may be used in the above procedure, in which case any current measure must not exceed 0.5 milliamp. Ifany measurement is out of the specified limits, there is a possibility of a shock hazard and the receiver must be repaired and rechecked before it is returned to the customer.

Hot check circuit



Insulation test

Connect an insulation tester between an exposed metallic part and A.C. line. Apply 1080VAC/ 60Hz for 1 second. Confirm that the current measurement is 0.5mA ~ 2.0mA. Repeat test with other metallic exposed parts.

X ray radiation

WARNING

The potential source of x ray radiation in the TV set is in the high voltage section and the picture tube.

NOTE

It is important to use an accurate, calibrated high voltage meter.

Set the brightness, picture, sharpness and color controls to minimum.
Measure the high voltage. The high voltage should be 30.55 ± 1.25kV. If the upper limit is out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature component failure.

Horizontal oscillator disable circuit test

This test must be performed as a final check before the receiver is returned to the customer. See horizontal oscillator disable circuit procedure check in this manual.

2. Service notes

NOTE

These components are affixed with glue. Be careful not to break or damage any foil under the component or at the pins of the ICs when removing. Usually applying heat to the component for a short time while twisting with tweezers will break the component loose.

Leadless chip component (surface mount)

Chip components must be replaced with identical chips due to critical foil track spacing. There are no holes in the board to mount standard transistors or diodes. Some chips capacitor or resistor board solder pads may have holes through the board,however the hole diameter limits standard resistor replacement to 1/8 watt. Standard capacitor may also be limited for the same reason. It is recommended that identical components be used.
Chip resistor have a three digit numerical resistance code, 1st and 2nd significant digits and a multiplier. Example: 162 = 1600 or 1.6k Ω resistor, 0 = 0 Ω (jumper).
Chip capacitors generally do not have the value indicated on the capacitor. The color of the component indicates the general range of the capacitance.
Chip transistors are identified by a two letter code. The first letter indicates the type and the

second letter, the grade of transistor.
Chip diodes have a two letter identification code as per the code chart and are a dual diode pack with either common anode or common cathode. Check the parts list for correct diode number.

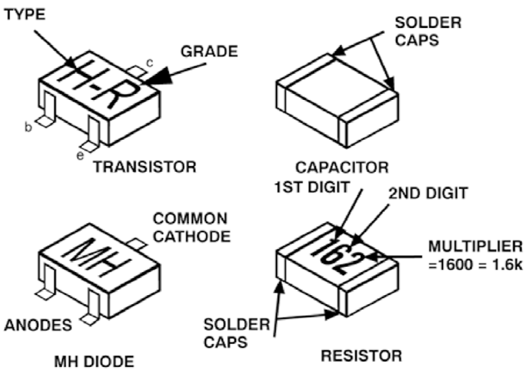
Component removal

1. **Use solder wick to remove solder from component end caps or terminal.**
2. **Without pulling up, carefully twist the component with tweezers to break the adhesive.**
3. **Do not reuse removed leadless or chip components since they are subject to stress fracture during removal.**

Chip component installation

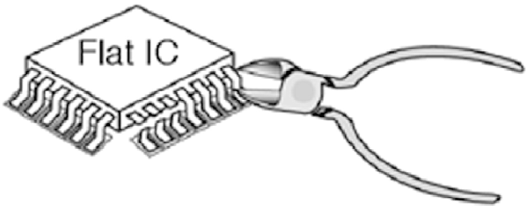
1. **Put a small amount of solder on the board soldering pads.**
2. **Hold the chip component against the soldering pads with tweezers or with a miniature alligator clip and apply heat to the pad area with a 30 watt iron until solder flows. Do not apply heat for more than 3 seconds.**

Chip components

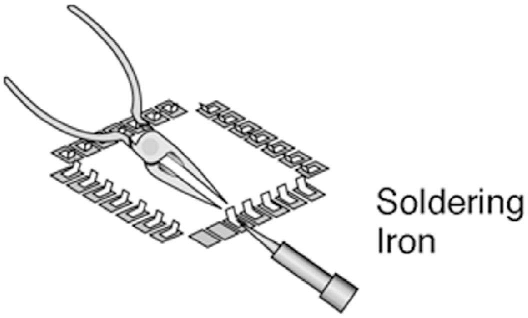


How to replace flat IC (required tools)

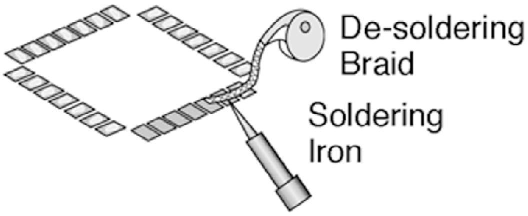
1. **Remove the solder from all of the pins of a Flat IC by using a desolder braid**



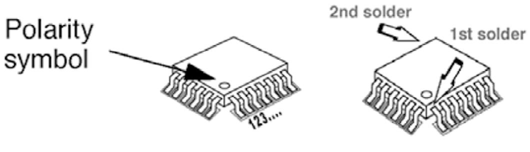
2. Put the iron wire under the pins of the Flat IC and pull it in the direction indicated while heating the pins using a soldering iron. A small awl can be used instead of the iron wire.



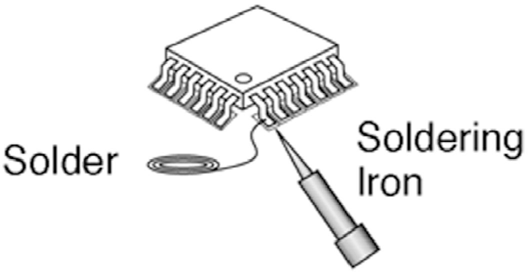
3. Remove the solder from all the pads of the Flat IC by using a de solder braid



4. Position the new Flat IC in place (apply the pins of the Flat IC to the soldering pads where the pins need to be soldered). Properly determine the positions of the soldering pads and pins by correctly aligning the polarity symbol



5. Solder all pins to the soldering pads using a fine tipped soldering iron



6. Check with a magnifier for solder bridge between the pins or for dry joint between pins and soldering pads. To remove a solder bridge, use a de solder braid as shown in the figure below

IMPORTANT

To protect against possible damage to the solid state devices due to arching or static discharge, make certain that all ground wires and CRT DAG wire are securely connected.

CAUTION

The power supply circuit is above earth ground and the chassis cannot be polarized. Use an isolation transformer when servicing the receiver to avoid damage to the test equipment or to the chassis. Connect the test equipment to the proper ground(hot) or (cold) when servicing, or incorrect voltages will be measured.

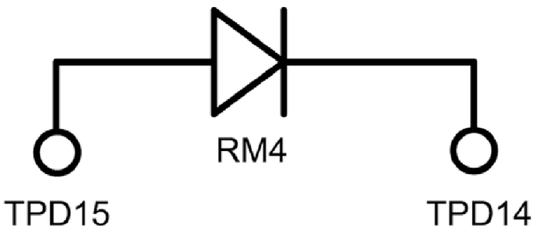
2.1. X-Ray Protection Circuit Check & Adjustments

This test must be performed as final check before the receiver is returned to the customer. If voltages are out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature componentfailure.

Equipment:

1. Isolation transformer.
2. High voltage meter.
3. D.C. Ammeter
4. Short jumper.
5. HHS jig (See figure below).

Diode Connection Jumper.



Preparation:

1. **Make sure the receiver is turned off.**
2. **Connect the receiver to an isolation transformer.**
3. **Connect the ammeter serial from the flyback anode lead to the picture tube anode socket.**
4. **Prepare short jumper and HHS jig.**

Procedure:

1. **Connect the short jumper between TPD16 & TPD17.**
2. **Connect the jumper diode between TPD14 and TPD15 (anode connected to TPD15 and cathode to TPD14).**
3. **Apply 75VAC to AC input of isolation transformer.**
4. **Turn the receiver on.**
5. **Apply a monoscope pattern.**
6. **Set customer picture and brightness controls to the minimum.**
7. **Set current within 50 μ A to 100 μ A by changing the picture and bright controls.**
8. **Slowly increase AC voltage at the input of the isolation transformer and confirm HHS voltage measure 34.5kV.**
9. **Turn power off and remove jigs.**

3. EEPROM replacement

If a new EEPROM integrated circuit is replaced for servicing, follow the next procedure once that the memory is properly assembled:

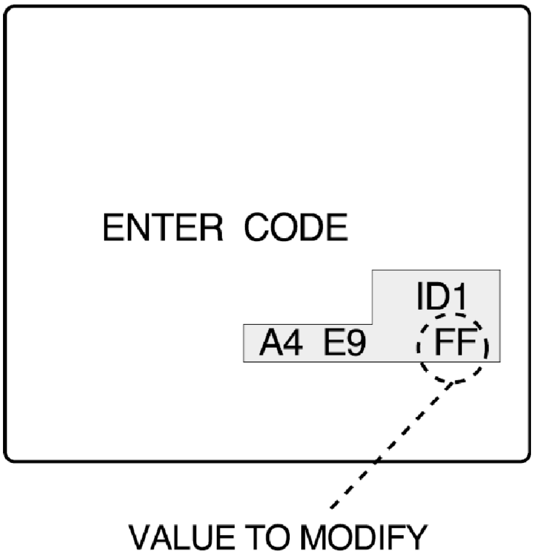
1. **Enter to service mode.**

2. Turn the TV set ON.

3. Once inside service mode the first image that appears on-screen is the ID1 register with the respective address value (FF) like the image below.

   Note:

   All 3 registers (ID1,ID2,ID3) should appear with FF values if a new EEPROM is assembled.



4. With "VOL" keys adjust the correct value according with the service adjustment table (see "Service Mode" section).

5. Change to the next ID switch register with "CH" keys and repeat the same procedure as step 4.

6. When replacing a new EEPROM be sure to set the correct ID switch values for each model.

7. Once that all 3 registers are set with the correct address value, perform all of the remaining adjustments and servicing.

IMPORTANT:

Correct ID switch configuration should be input when replacing EEPROM for each television model, otherwise if wrong values are configured, the television software will not function accordingly and properly.

4. About lead free solder (PbF)

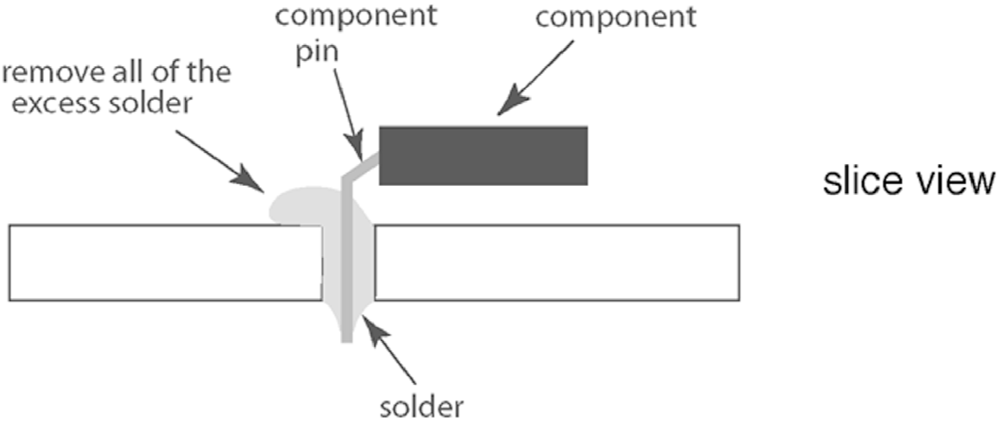
NOTE

Lead is listed as (Pb) in the periodic table of elements. / In the information below, Pb will refer to lead solder, and PbF will refer to Lead Free Solder. / The lead free solder used in our manufacturing process and discussed below is (Sn+Ag+Cu). / Thatis Tin (Sn), Silver (Ag) and Copper (Cu) although other types are available.

This model uses Pb Free solder in it's manufacture due to environmental conservation issues. For / service and repair work, we'd suggest the use of Pb free solder as well, although Pb solder may be / used. / PCBs manufacturedusing lead free solder will have the "PbF" or a leaf symbol stamped on the / back of PCB.

CAUTION

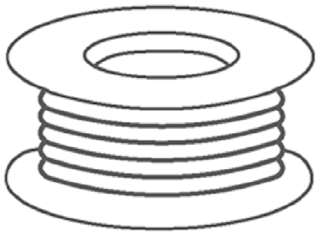
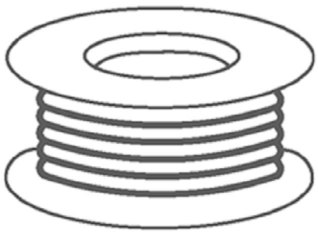
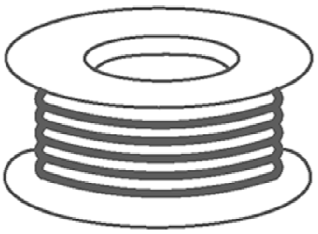
- Pb free solder has a higher melting point than standard solder. Typically the melting point is 50 ~ 70 °F (30 ~ 40 °C) higher. Please use a high temperature soldering iron and set it to 700 ± 20 °F (370 ± 10 °C).
- Pb free solder will tend to splash when heated too high (about 1100 °F or 600 °C). / If you must use Pb solder, please completely remove all of the Pb free solder on the pins or solder area before applying Pb solder. If thisis not practical, be sure to heat the Pb free solder until it melts, before applying Pb solder.
- After applying PbF solder to double layered boards, please check the component side for excess solder which may flow onto the opposite side.



Suggested Pb free solder

There are several kinds of Pb free solder available for purchase. This product uses Sn+Ag+Cu (tin, silver, copper) solder. However, Sn+Cu (tin, copper), Sn+Zn+Bi (tin, zinc, bismuth) solder

can also beused.

0.3mm X 100g	0.6mm X 100g	1.0mm X 100g
		

5. Receiver feature table

FEATURE/MODEL	CT-27SL13MG/MUG	CT-27SL33MG/MUG
CHASSIS	AP415	BP415
MICRO	128K	
MENU LANGUAGE	ENG/SPAN/FR	
CLOSED CAPTION	X	
V-CHIP (USA/CANADA)	X	
CHANNEL COUNT	181	
PIP (1T), 2T PIP (2T), 2T SPLIT	not available	2T
CHANNEL INFO BANNER	X	
VIDEO INPUT SKIP	SKIP	
75 OHM INPUT	X	
REMOTE CONTROL	EUR7613Z60	EUR7713Z70
CRT SUPPLIER	MDDA (FLAT)	
FAMILY	NA10	
COMB FILTER	3 DIG	
HEC/VEC (X=BOTH)	X	
VM	X	
V/A NORM (X=BOTH)	V	
COLOR TEMP	X	
PRESET/INPUT LABELING	X	
VIDEO INPUT PICTURE MEMORY	X	
MTS/SAP/DBX	X	
BUILT-IN AUDIO POWER	5Wx2	
No. OF SPEAKERS	2	
BASS/BAL/TREBLE CONTROL	X	
AI SOUND	X	
SURROUND	X	
SPATIALIZER/BBE	BBE	
A/V IN (REAR/FRONT)	3(2/1)	
AUDIO OUT (FAO: F, VAO: V)	F, V	
COMPONENT INPUT (Y, Pb, Pr)	1	

FEATURE/MODEL	CT-27SL13MG/MUG	CT-27SL33MG/MUG
S-VIDEO INPUT (REAR/FRONT)	1/0	
EPJ/HPJ/MISC	HPJ	
DIMENSIONS(WxDxH)	754.3x534.3x601.6mm29.69x21.04x23.69in	665x544.3x594.8mm26.18x21.43x23.41in
WEIGHT (Kg/Lbs)	35.4/78.04	34.5/76.05

Note:
Specifications are subject to change without notice or obligation. Dimensions and weights are approximate.

6. Board description table

CT-27SL13MG / CT-27SL13MUG

BOARD	PART NUMBER	DESCRIPTION
A	TNP2AH047MA	MAIN BOARD
C	TNP2AA157AA	CRT BOARD

CT-27SL33MG / CT-27SL33MUG

BOARD	PART NUMBER	DESCRIPTION
A	TNP2AH047MB	MAIN BOARD
C	TNP2AA157AA	CRT BOARD
Y	TNP2AA123	PIP BOARD

NOTE
When ordering a replacement board assembly, append an “S” to the board number

EXAMPLE
To order the A Board, for CT-27SL13MG the replacement board is TNP2AH047MAS.

7. Reference for PDF colors

DESCRIPTION OF PDF LINK COLORS	
TYPE	DESTINATION
SCHEMATIC	
YELLOW ON IC	IC ON PCB
YELLOW ON CONNECTOR	CONNECTOR ON PCB
YELLOW ON SCHEMATIC	PCB
CYAN	WAVEFORM
GREEN ON SIDE	SCHEMATIC CONTINUED
GREEN ON CONNECTOR	CONNECTOR CONNECTION
BLUE ON IC	VOLTAGE
PCB	
BLUE ON IC	IC ON SCHEMATIC
BLUE ON CONNECTOR	CONNECTOR ON SCHEMATIC
BLUE ON PCB	SCHEMATIC
GREEN ON SIDE	PCB CONTINUED
BLOCK DIAGRAMS	
GREEN ON IC	IC ON SCHEMATIC
GREEN ON SIDE	BLOCK DIAGRAM CONTINUED

8. Schematics

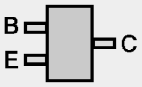
8.1. English schematic notes

Notes:

IMPORTANT SAFETY NOTICE

THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH A ⚠ IN THE SCHEMATIC.

CHIP TRANSISTOR LEAD DESIGNATION



SCHEMATIC NOTES

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value notes is inductance in µH.
4. Test point indicated by ; Test point but no pin .
5. Components indicated with ⚠ are critical parts and replacement should be made with manufacture specified replacement parts only.
6. ▬ (**BOLD LINE**) indicates the route of B+ supply.
7. The schematic diagrams are current at the time of printing and are subject to change without notice.
8. Ground symbol indicates **HOT GROUND CONNECTION**; indicates COLD GROUND.

NOTE: All other component symbols are used for engineering design purposes.

VOLTAGE MEASUREMENTS

1. Voltage measurement:
   - AC input to the Receiver is 120V. NTSC (HD, 1125i & 525P when applicable) signal generator is connected to the antenna of the Receiver. (Color bar pattern of 100 IRE white and 7.5 IRE black.)
   - All Picture and Audio adjustments are set to Normalize.
     TV ANT/CABLE - (Set-Up Menu) in TV/ANT Mode
     Volume - Min.
     TV/Video SW - TV position
     Audio Mode - Stereo
   - Voltage readings are nominal and may vary ±10% on active devices. Some voltage reading will vary with signal strength and picture content.
   - Supply voltages are nominal.
2. Ground symbol indicates ground lead connection of meter.
   Incorrect ground connection will result in erroneous readings.

CAUTION: ***Incorrect ground connection of the test equipment will result in erroneous readings.***

WAVEFORM MEASUREMENTS

1. indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
2. Taken with an NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black.)
3. Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to "MIN".
4. All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak altitudes may vary depending on the type of Oscilloscope used and its settings.
5. Ground symbol shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.

CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

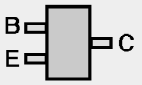
8.2. Notas de esquem á ticos en espa ñ ol

Notas

NOTA DE SEGURIDAD

LOS DIAGRAMAS ELÉCTRICOS INCLUYEN CARACTERÍSTICAS ESPECIALES MUY IMPORTANTES PARA LA PROTECCIÓN CONTRA RAYOS-X, QUEMADURAS Y DESCARGAS ELÉCTRICAS. CUANDO SE DE SERVICIO ES IMPORTANTE USAR PARA REEMPLAZO DE COMPONENTES CRITICOS, SOLO PARTES ESPECIFICADAS POR EL FABRICANTES. LOS COMPONENTES CRITICOS ESTAN SEÑALADOS EN LOS DIAGRAMAS POR EL SIMBOLO ⚠.

IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN *CHIP*



NOTAS DE LOS DIAGRAMAS

1. Las Resistencias son de Carbón de 1/4W, a menos que se indique otra característica.
2. Los Capacitores son de Cerámica para 50V, a menos que se indique otra característica.
3. El valor indicado de las Bobinas es la inductancia expresada en µH.
4. Los puntos de prueba en la terminal de algún componente son indicados por Los puntos de prueba fuera de los componentes se indican con .
5. Los componentes señalados con el símbolo ⚠ son considerados componentes críticos y deben ser reemplazados sólo con las partes especificadas por el fabricante.
6. ▬▬ (**LINEA GRUESA**) indica las líneas de alimentación de los Voltajes B+.
7. Los diagramas eléctricos están sujetos a cambio sin previo aviso.
8. El símbolo indica que es una conexión a **Tierra Caliente** y el símbolo indica conexión a **Tierra Fría**.

NOTA:* *Los demas símbolos de componentes incluidos son usados con fines de diseño.

MEDICIÓN DE VOLTAJES

1. Medición de voltaje:
   - El voltaje de entrada al Receptor es de 120V de Corriente Alterna. Un generador de patrones con formato NTSC se conecta a la entrada de la antena. (Patrón de Barras de Colores con 100 IREs para el Blanco y 7.5 IREs para el Negro.)
   - Los ajustes de los Menus Picture y Audio se normalizan.
     En el Menú Set-Up, en la opción ANTENA, se selecciona el modo de CABLE.
     El nivel de Volumen se minimiza.
     De los modos TV y Video, seleccionar el modo TV.
     Seleccionar modo Estereo del Audio.
   - Las mediciones de los voltajes son nominales y pueden variar hasta 10% en componentes en funcionamiento. Las lecturas de los voltajes pueden variar por la potencia de la señal y el contenido de la imagen.
   - Las fuentes de voltajes son nominales.
2. El símbolo indica el tipo de tierra que se utiliza en la conexión del medidor.

PRECAUCION: Si no se utiliza la conexión a la tierra adecuada, se obtendrán mediciones equivocadas y podría dañar el equipo de medición.

MEDICIÓN DE FORMAS DE ONDA

1. Un símbolo como ③ indica el punto para medir una señal. (La medición puede hacerse en el punto con mayor accesibilidad, siempre que sea común al indicado.)
2. Se midieron utilizando un generador con formato NTSC conectado a la terminal de la antena. (Patrón de 8 Barras de Colores EAI, formato NTSC de 100 IREs para el Blanco y 7.5 IREs para el Negro.)
3. Los ajustes de usuario de los Menus PICTURE y AUDIO se normalizaron. Posteriormente el nivel de volumen se ajusta al mínimo.
4. Las formas de onda de Video y Color fueron tomadas con un osciloscopio de banda alta y con un punta de prueba de baja capacitancia (10 a 1). La forma y amplitud de las ondas puede variar según el tipo de osciloscopio que se utilice y sus características.
5. El símbolo de tierra que aparece junto al número de la forma de onda, indica que se utiliza conexión a **Tierra Caliente** en el extremo negativo de la punta de prueba.

PRECAUCION: Si no se utiliza la conexión a la tierra adecuada, se obtendrán mediciones equivocadas y podría dañar el equipo de medición.

8.3. A-Board schematic TNP2AH047MA (1 of 4)

8.4. A-Board schematic TNP2AH047MA (2 of 4)

8.5. A-Board schematic TNP2AH047MA (3 of 4)

8.6. A-Board schematic TNP2AH047MA (4 of 4)

8.7. A-Board schematic TNP2AH047MB (1 of 4)

8.8. A-Board schematic TNP2AH047MB (2 of 4)

8.9. A-Board schematic TNP2AH047MB (3 of 4)

8.10. A-Board schematic TNP2AH047MB (4 of 4)

8.11. C-Board schematic TNP2AA157AA (1 of 2)

8.12. C-Board schematic TNP2AA157AA (2 of 2)

9. Parts list

9.1. Parts list notes

Important Safety Notice

Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use manufacturer's specified parts.

Abbreviation of part name and description

1. Resistor

Example :
ERD25TJ104 **C** 100KΩ, **J**, 1/4W
(C = Type, J = Allowance)

Type	Allowance
C : Carbon	F : ± 1%
F : Fuse	G : ± 2%
M : Metal Oxide Metal Film	J : ± 5% K : ± 10%
S : Solid	M : ± 20%
W : Wire Wound	

2. Capacitor

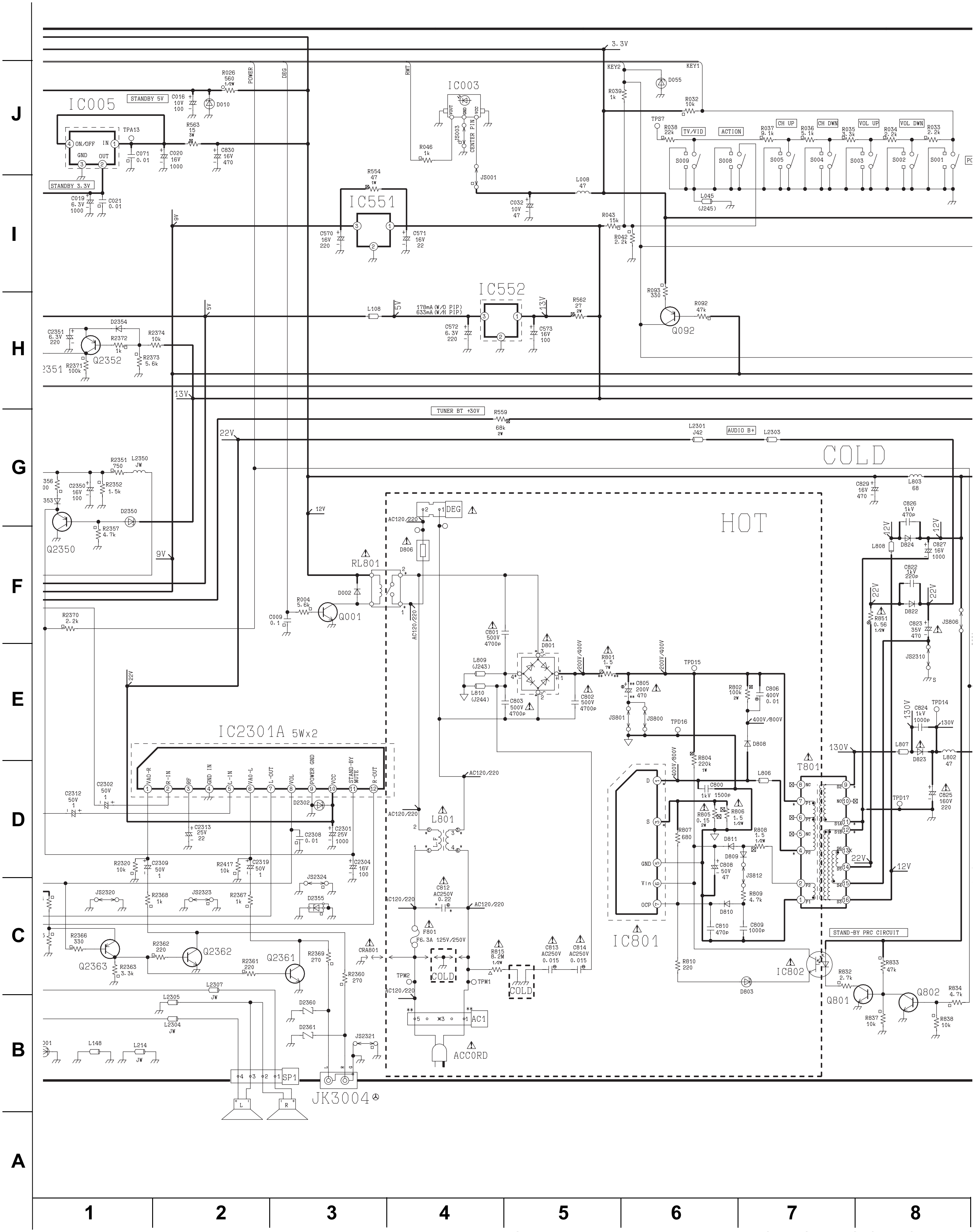
Example :
ECKF1H103ZF **C** 0.01μF, **Z**, 50V
(C = Type, Z = Allowance)

Type	Allowance
C : Carbon	C : ± 0.25pF
E : Electrolytic	D : ± 0.5pF
P : Polyester Polypropylene	F : ± 1pF G : ± 3%
T : Tantalum	J : ± 5%
	K : ± 10%
	L : ± 15%
	M : ± 20%
	P : ± 100%, -0%
	Z : ± 80%, -20%

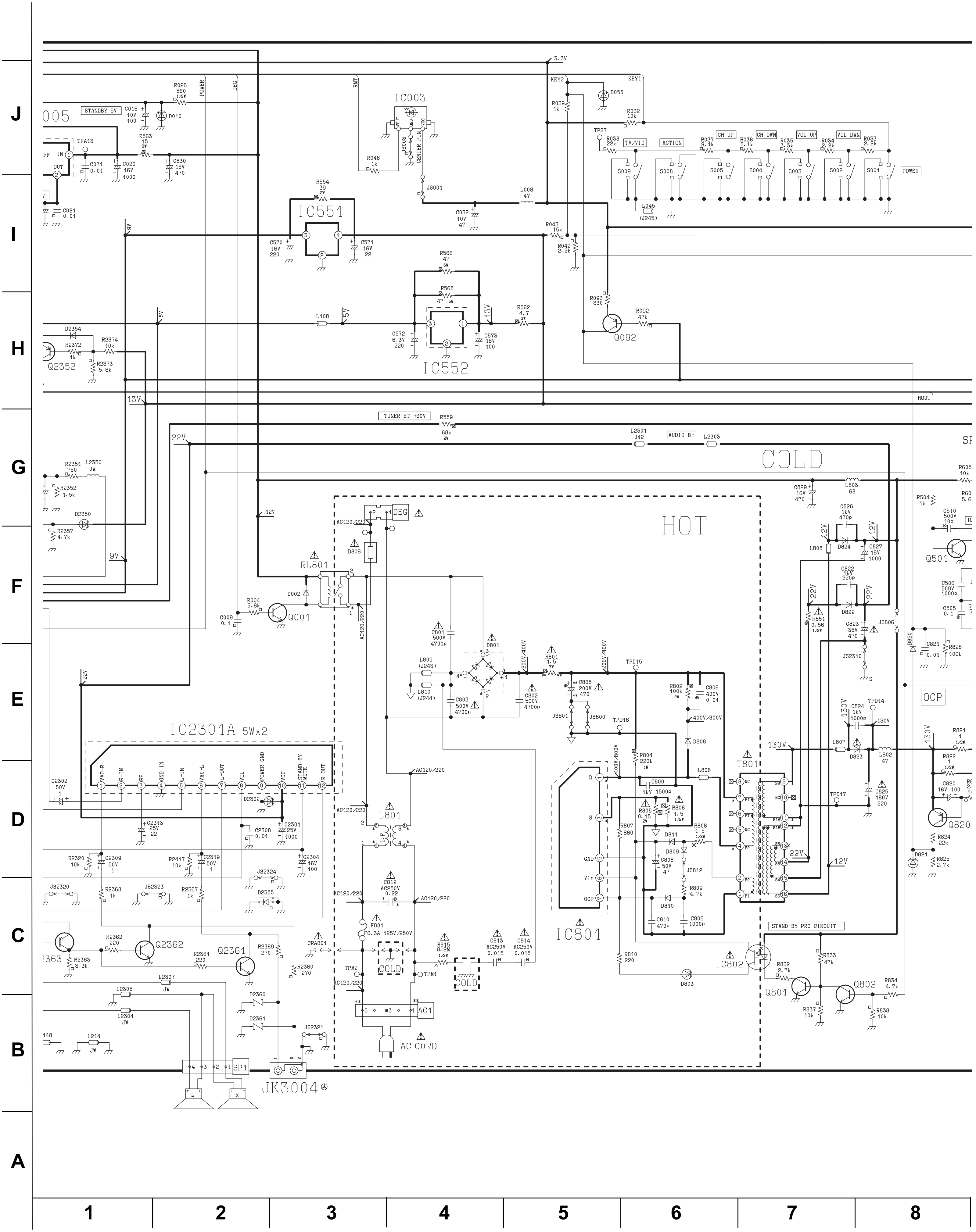
9.2. Difference parts list

Ref. No.	Part No.	Part Name & Description	Remarks
CAPACITORS			
C565	ECKW3D221JBR	CAP C 220PF-J-2KVDC	⚠
C568	ECQM4333JZW	CAP P .039UF-J-400V	⚠
C563	ECWH20822JVB	CAP P 8200PF-2KV	⚠
INTEGRATED CIRCUITS			
IC002	TVR2AJ179S	ADJUSTED EEPROM / CT-27SL13MG/UMG, CT-27SL33MG/UMG	
COILS			
L801	ELF21V018A	COIL	⚠
L551	ELH5L7138	COIL	⚠
RESISTORS			
R547	ERQ1CJP1R2S	RES F 1.2-J-1W	⚠
OTHERS			
M001	M68LZP195X	CRT 27” / CT-27SL13MG/UMG, CT-27SL33MG/UMG	⚠
DY	TLY2AA033	DEFLECTION YOKE / CT-27SL13MG/UMG, CT-27SL33MG/UMG	⚠

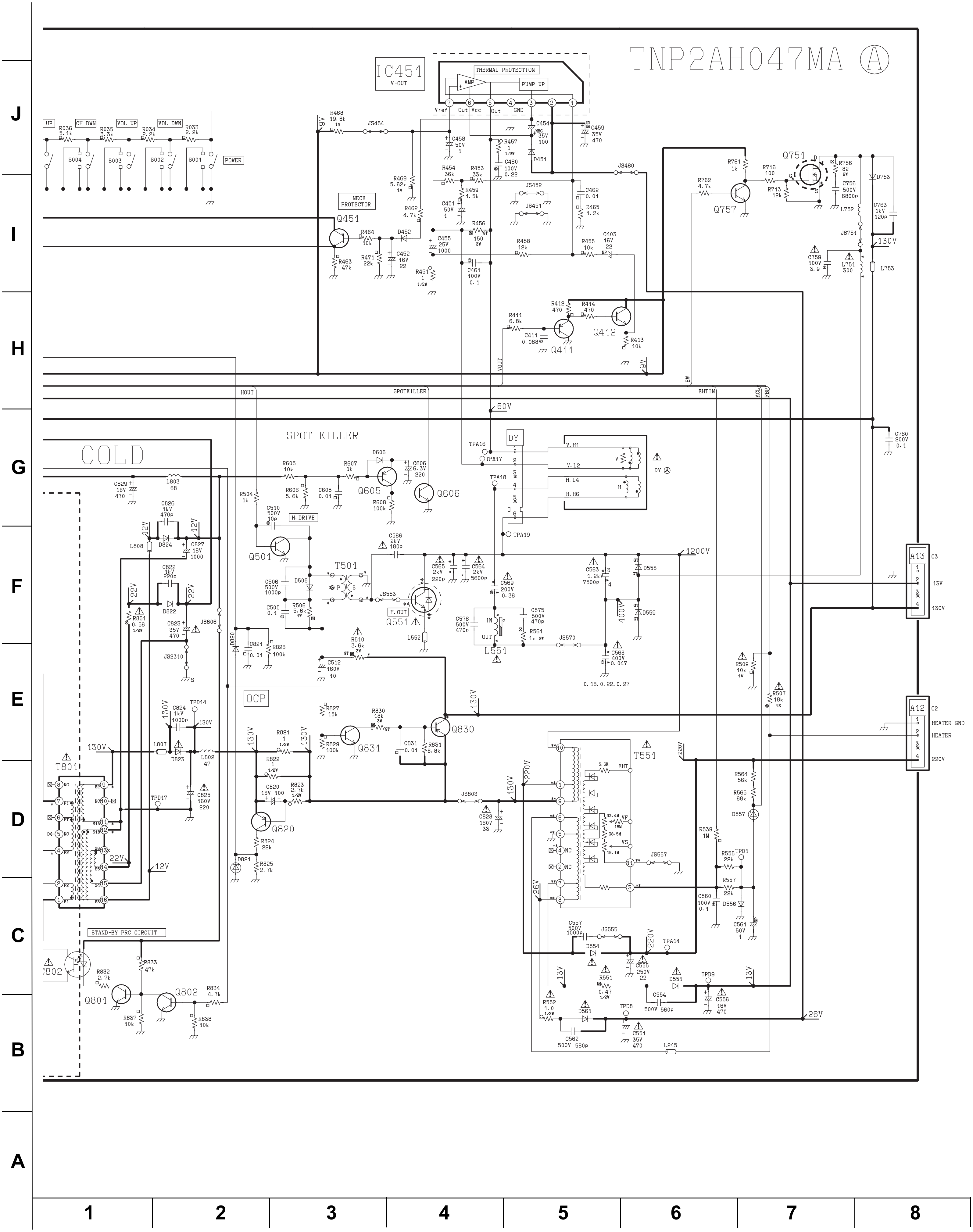
Note:
Use this difference parts list together with parts list included in simplified service manual order No. MTNC030733A1 (CT-27SL33G).



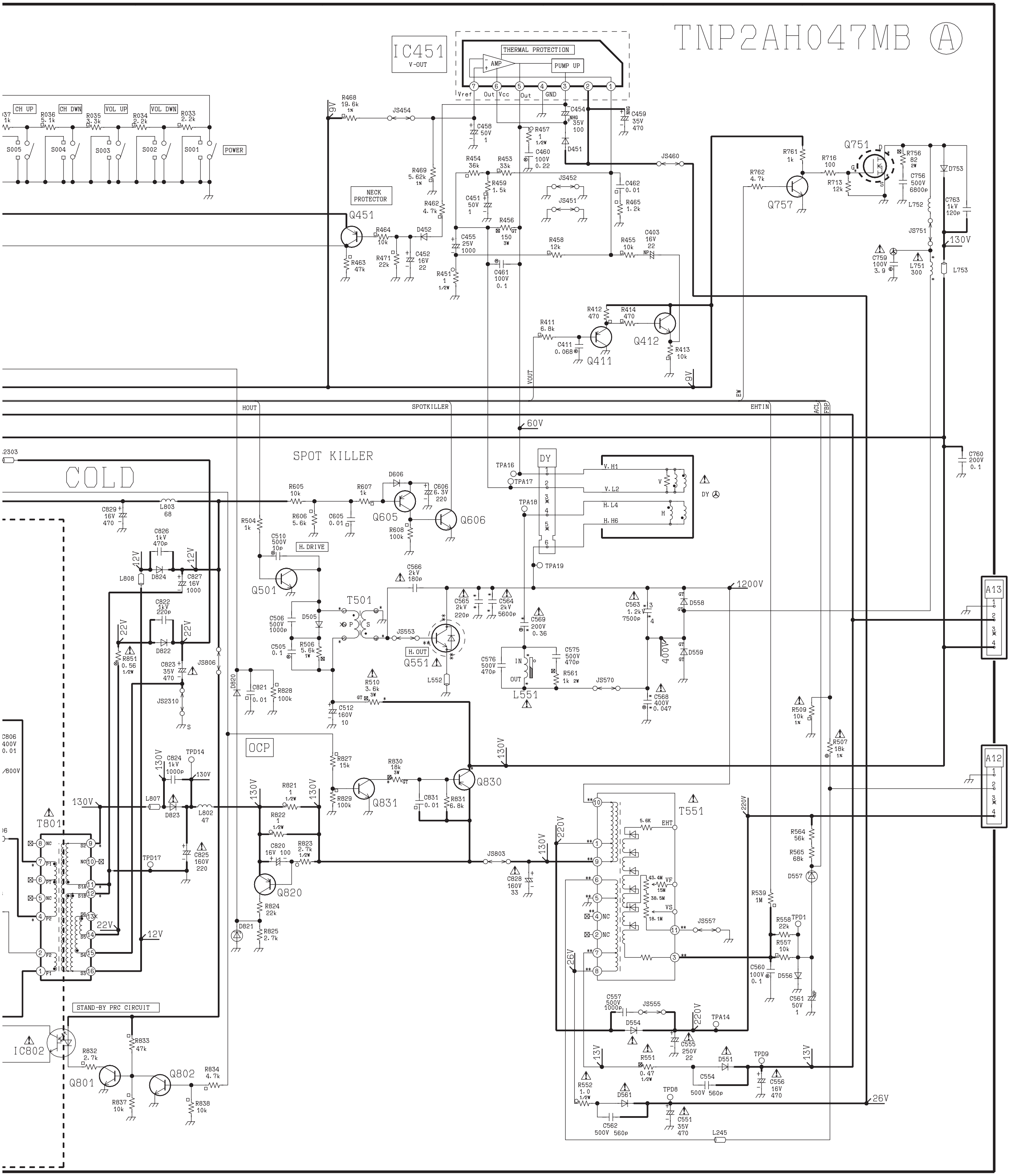
IC005
STANDBY 5V
STANDBY 3.3V
IC003
IC551
IC552
3.3V
KEY1
KEY2
TV/VID
ACTION
CH UP
CH DWN
VOL UP
VOL DWN
S009
S008
S005
S004
S003
S002
S001
Q092
Q2352
Q2350
TUNER BT +30V
AUDIO B+
COLD
HOT
RL801
Q001
DEG
D801
L801
F801
F6.3A 125V/250V
IC2301A 5Wx2
T801
IC801
IC802
Q801
Q802
STAND-BY PRC CIRCUIT
Q2363
Q2362
Q2361
ACCORD
AC1
SP1
JK3004
J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8



J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
3.3V
KEY2
KEY1
STANDBY 5V
POWER
DEG
RMT
IC003
CENTER PIN
JS001
JS003
D055
D010
TPA13
TPS7
TV/VID
ACTION
CH UP
CH DWN
VOL UP
VOL DWN
S009
S008
S005
S004
S003
S002
S001
L045
(J245)
IC551
IC552
L008
L108
Q092
Q2352
HOUT
TUNER BT +30V
AUDIO B+
COLD
HOT
DEG
RL801
Q001
D002
D806
L809
(J243)
L810
(J244)
D801
C801
C802
C803
C805
C806
TPD15
TPD16
JS801
JS800
D808
IC801
T801
L806
D811
D809
D810
JS812
IC802
Q801
Q802
D803
STAND-BY PRC CIRCUIT
OCP
Q501
Q820
L807
L802
D823
D824
D822
D820
D821
JS806
JS2310
TPD14
TPD17
IC2301A 5Wx2
VAO-R
R-IN
RF
GND IN
L-IN
VAO-L
L-OUT
VOL
POWER GND
VCC
STAND-BY MUTE
R-OUT
D2302
D2355
JS2320
JS2323
JS2324
JS2321
Q2361
Q2362
L801
F801
F6.3A 125V/250V
CRA801
TPM1
TPM2
AC1
AC CORD
SP1
JK3004
L
R
AC120/220
400V/800V
200V/400V
130V
22V
12V
13V
9V
5V

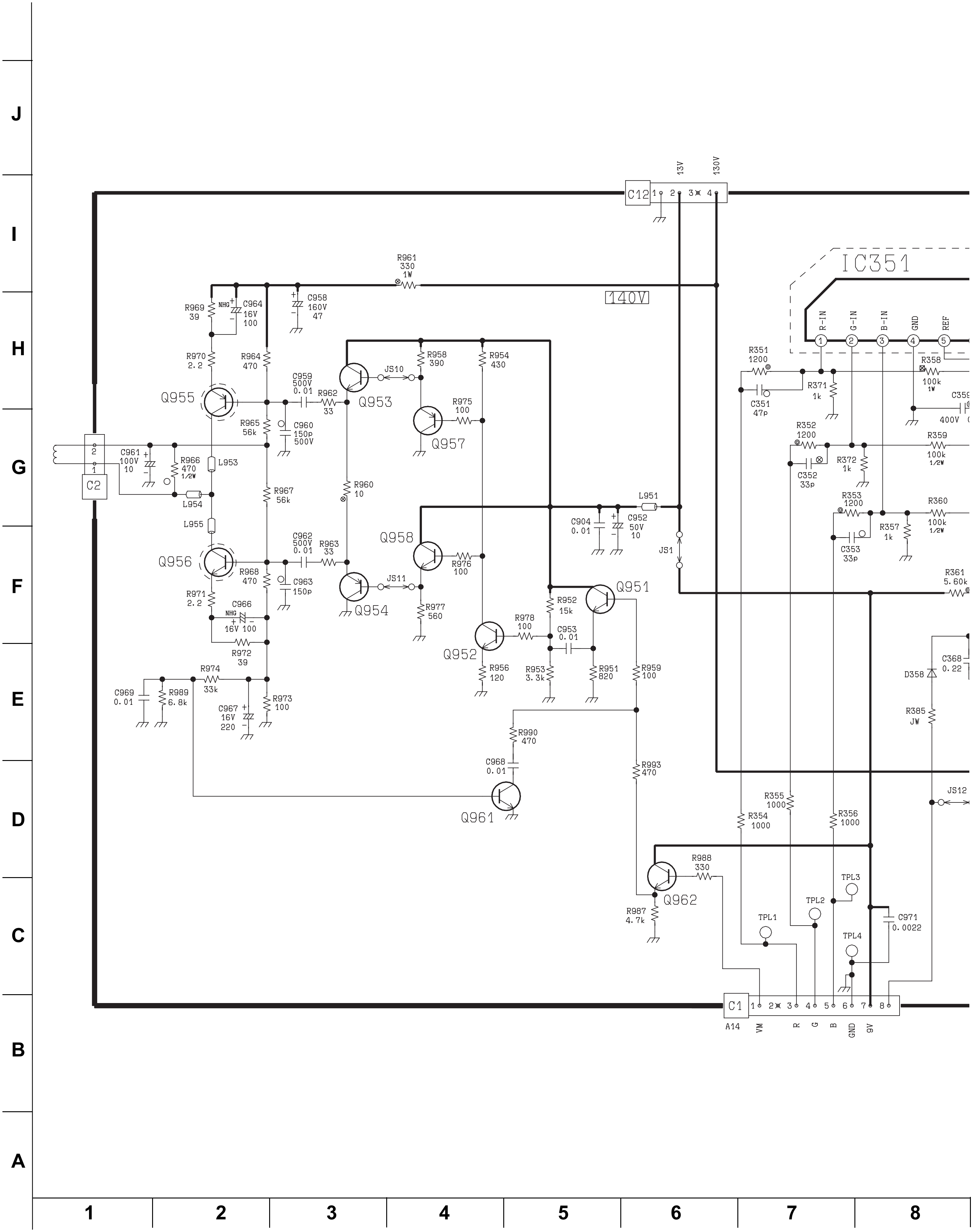


TNP2AH047MA Ⓐ
IC451
V-OUT
THERMAL PROTECTION
AMP
PUMP UP
Vref
Out Vcc
Out
GND
UP
CH DWN
VOL UP
VOL DWN
R036 5.1k
R035 3.3k
R034 2.2k
R033 2.2k
S004
S003
S002
S001
POWER
NECK PROTECTOR
Q451
Q751
Q757
Q411
Q412
HOUT
SPOTKILLER
VOUT
EHTIN
ACL
FBP
60V
130V
1200V
SPOT KILLER
COLD
DY
V.H1
V.L2
H.L4
H.H6
Q605
Q606
H.DRIVE
Q501
T501
H.OUT
Q551
L551
A13
13V
130V
A12
HEATER GND
HEATER
220V
OCP
Q830
Q831
Q820
T551
EHT
T801
STAND-BY PRC CIRCUIT
Q801
Q802
26V
12V
22V
J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8

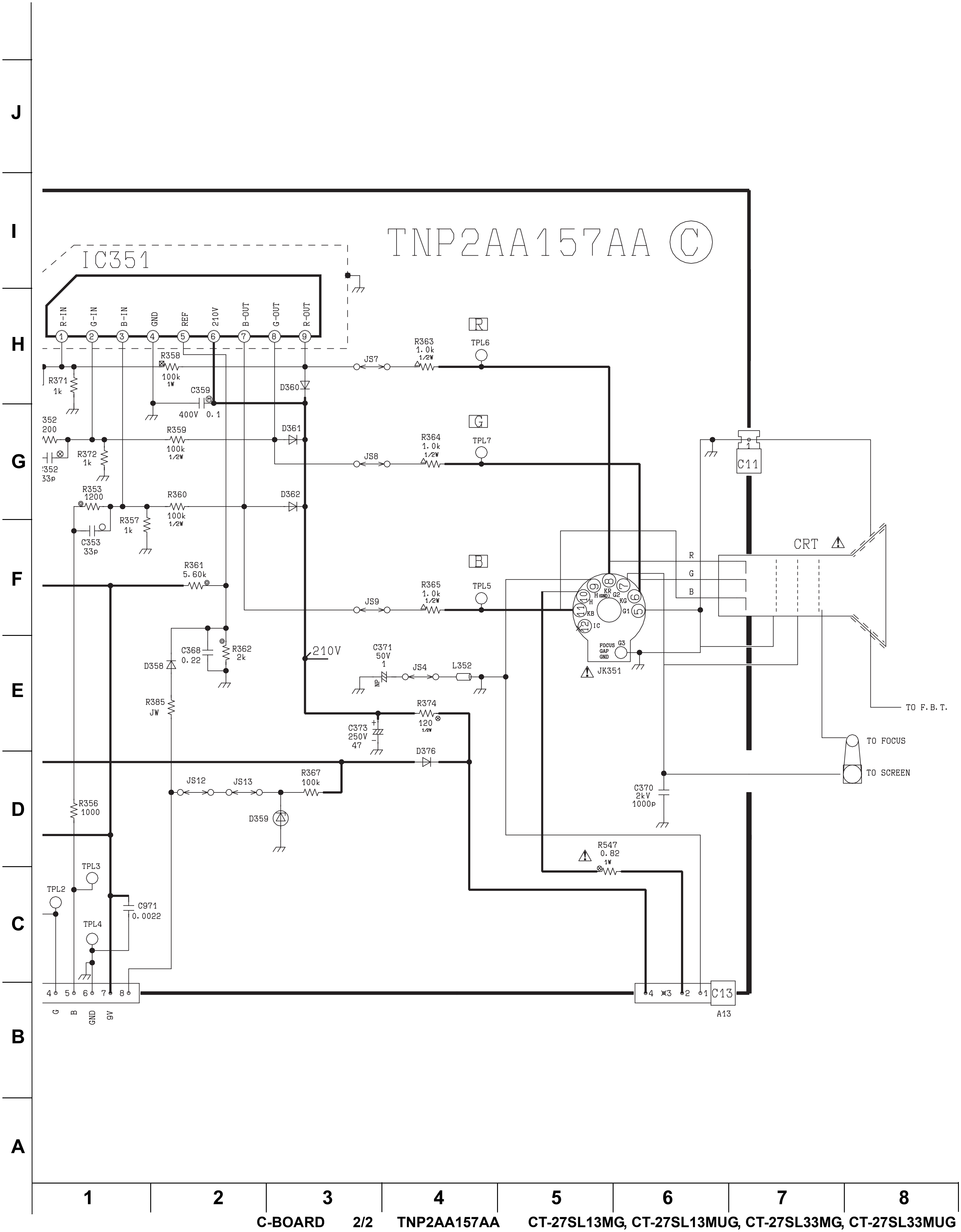


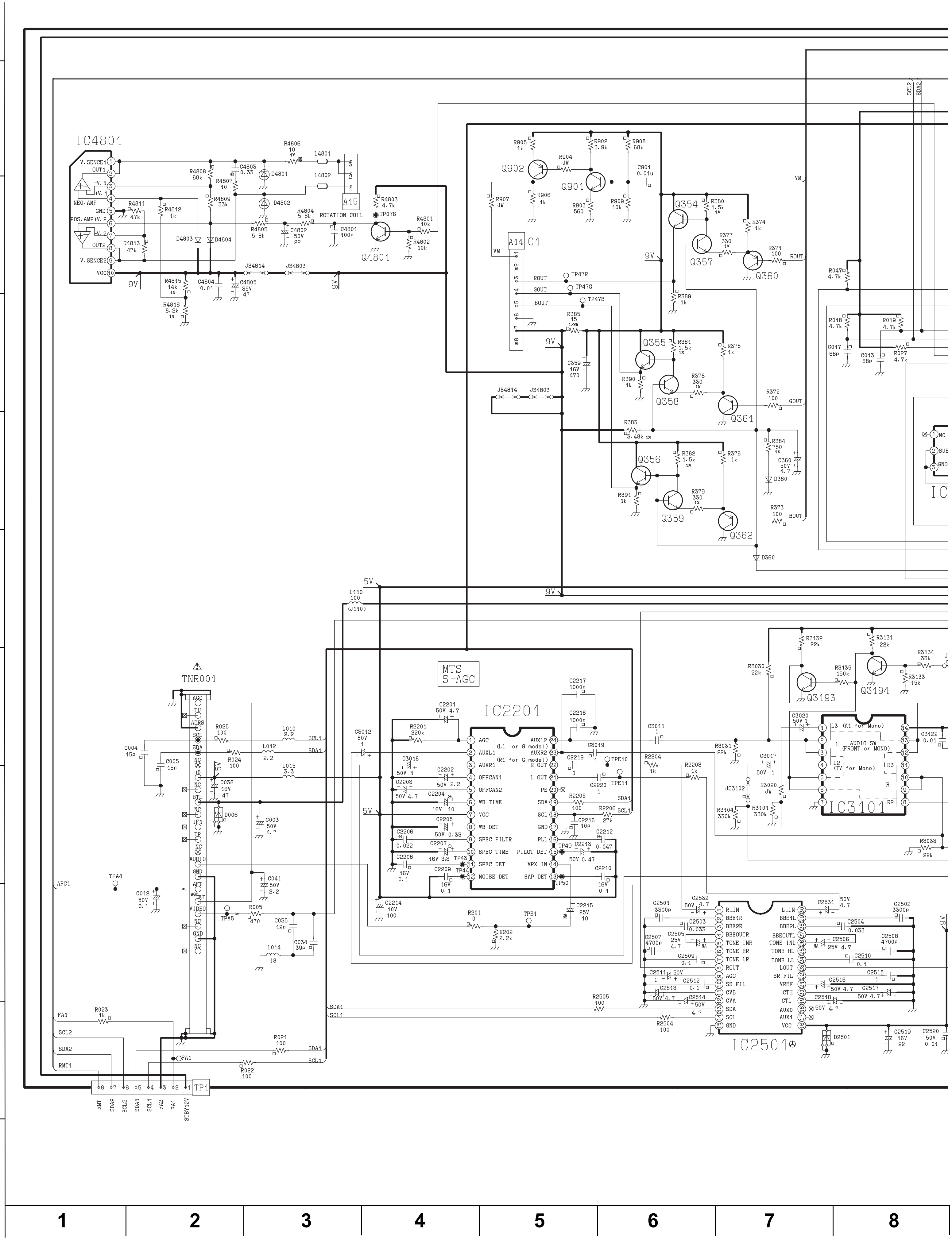
J	I	H	G	F	E	D	C	B	A

1	2	3	4	5	6	7	8

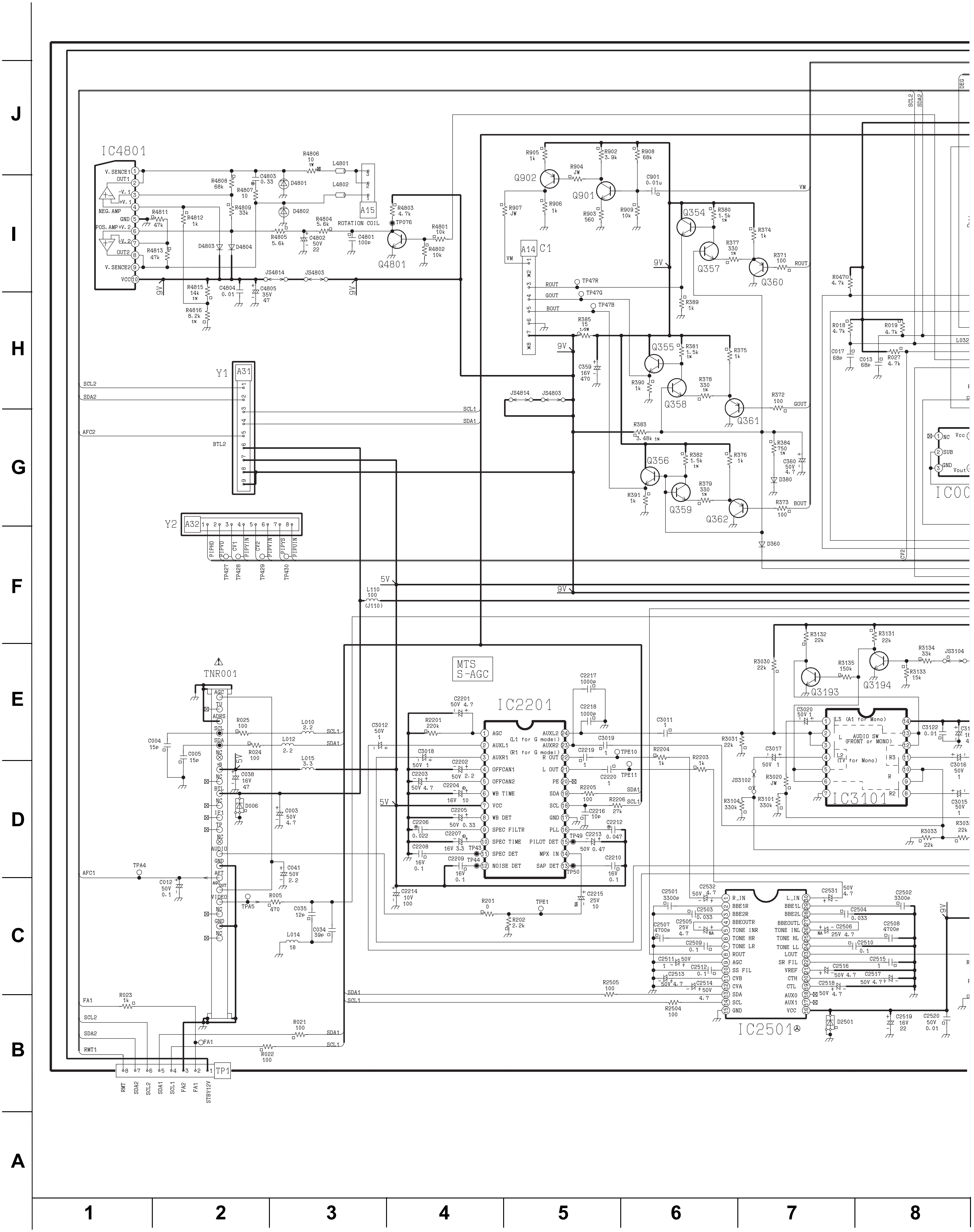


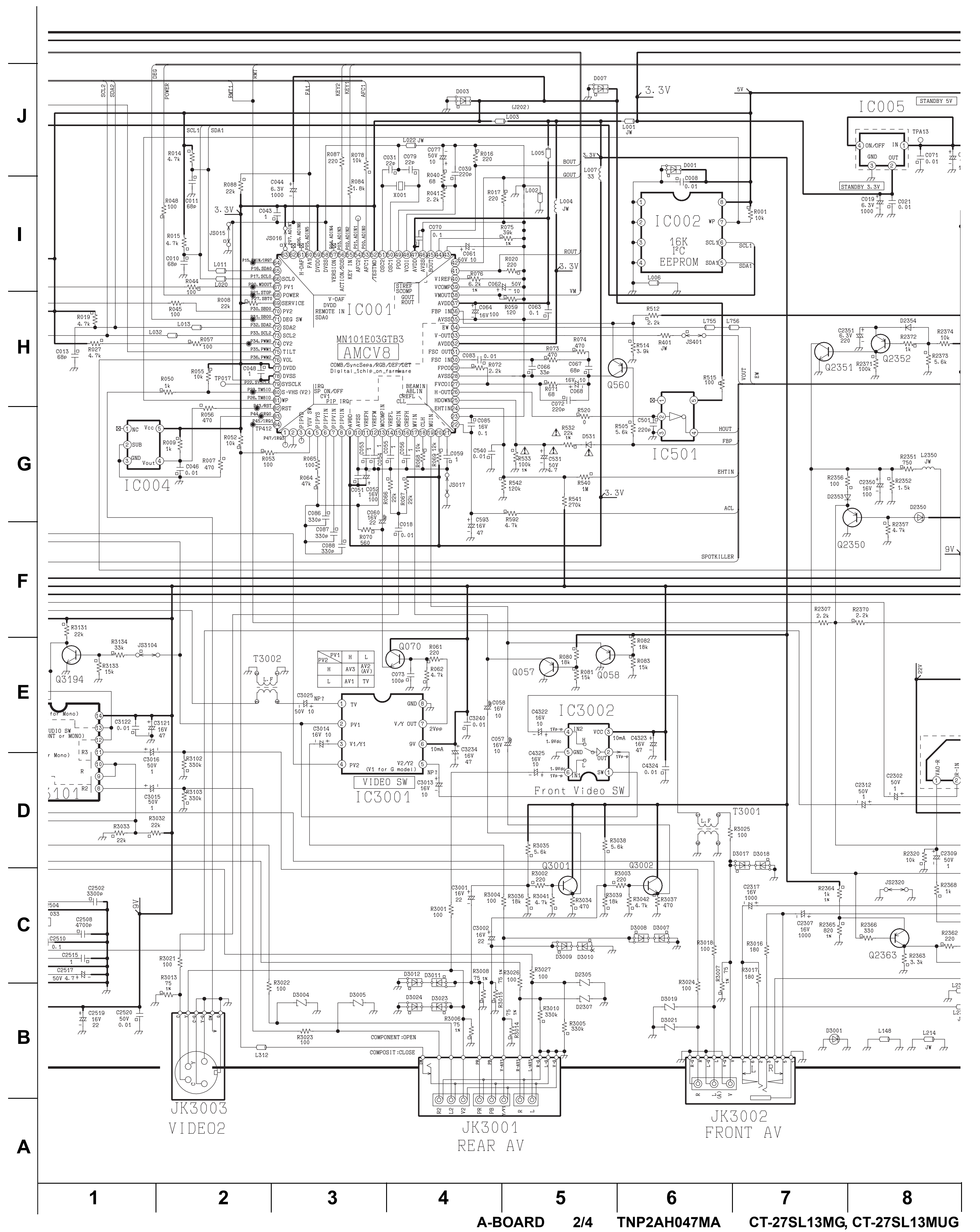
C-BOARD 1/2 TNP2AA157AA CT-27SL13MG, CT-27SL13MUG, CT-27SL33MG, CT-27SL33MUG


TNP2AA157AA ©
IC351
R-IN
G-IN
B-IN
GND
REF
210V
B-OUT
G-OUT
R-OUT
R358
100k
1W
R371
1k
C359
400V 0.1
D360
JS7
R363
1.0k
1/2W
TPL6
R
352
200
R372
1k
352
33p
R359
100k
1/2W
D361
JS8
R364
1.0k
1/2W
TPL7
G
R353
1200
R357
1k
C353
33p
R360
100k
1/2W
D362
R361
5.60k
JS9
R365
1.0k
1/2W
TPL5
B
C368
0.22
R362
2k
D358
210V
C371
50V
1
NP
JS4
L352
R385
JW
C373
250V
47
R374
120
1/2W
D376
JS12
JS13
R367
100k
D359
R356
1000
TPL3
TPL2
TPL4
C971
0.0022
G
B
GND
9V
C11
CRT
R
G
B
KR
H (GND)
G2
KG
KB
G1
IC
FOCUS GAP GND
G3
JK351
TO F.B.T.
TO FOCUS
TO SCREEN
C370
2kV
1000p
R547
0.82
1W
C13
A13

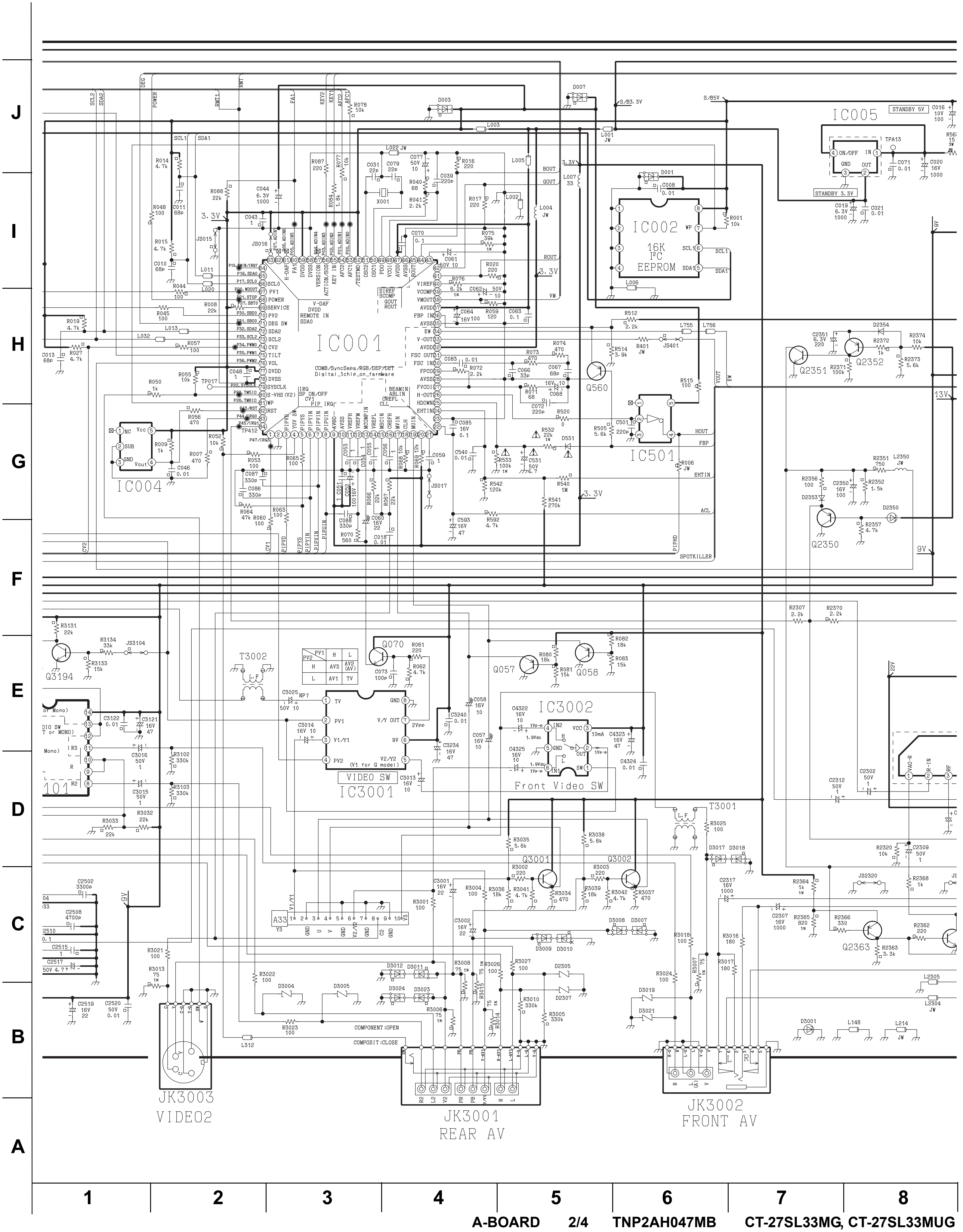


A-BOARD 1/4 TNP2AH047MA CT-27SL13MG, CT-27SL13MUG


IC4801
IC2201
IC2501
IC3101
TNR001
MTS
S-AGC
Y1
Y2
A31
A32
A14
A15
TP1
ROTATION COIL
AUDIO SW (FRONT or MONO)
Q4801
Q902
Q901
Q354
Q357
Q360
Q355
Q358
Q361
Q356
Q359
Q362
Q3193
Q3194



IC005
IC002
16K
I²C
EEPROM
IC001
MN101E03GTB3
AMCV8
IC004
IC501
Q560
Q2351
Q2352
Q2350
Q3194
T3002
Q070
Q057
Q058
IC3002
Front Video SW
VIDEO SW
IC3001
T3001
Q3001
Q3002
Q2363
JK3003
VIDEO2
JK3001
REAR AV
JK3002
FRONT AV


IC001
IC002
16K
I²C
EEPROM
IC004
IC005
IC501
IC3001
VIDEO SW
IC3002
Front Video SW
T3001
T3002
JK3001
REAR AV
JK3002
FRONT AV
JK3003
VIDEO2
COMPONENT:OPEN
COMPOSIT:CLOSE
STANDBY 5V
STANDBY 3.3V

MTNC030733A1
B05

Service Manual

Color Television

Simplified

CT-27SL13G / CT-27SL13UG / CT-27SL33G / CT-27SL33UG

NA10

This simplified service manual is issued to add listed models to the main service manual order No. MTNC030623C1 (CT-25L8G). A complete parts list and schematics are included in this simplified service manual. Please file and use this simplified servicemanual together with the main service manual order No. MTNC030623C1 (CT -25L8G).

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⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

Panasonic®

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are marked by ⚠ in the Schematic Diagrams, Circuit Board Diagrams, Exploded Views and Replacement Parts List. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire or other hazards. Do not modify the original design without permission of manufacturer.

1. Safety precautions

General guidelines

An isolation transformer should always be used during the servicing of a receiver whose chassis is not isolated from AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injuryfrom electrical shocks. It will also protect the receiver from being damaged by accidental shorting that may occur during servicing.

When servicing, observe the original lead dress, especially in the high voltage circuit. Replace all damaged parts (also parts that show signs of overheating.)

Always replace protective devices, such as fish paper, isolation resistors and capacitors, and shields after servicing the receiver. Use only manufacturer’s recommended rating for fuses, circuits breakers, etc.

High potentials are present when this receiver is operating. Operation of the receiver without the rear cover introduces danger for electrical shock. Servicing should not be performed by anyone who is not thoroughly familiar with the necessary precautionswhen servicing high voltage equipment.

Extreme care should be practiced when handling the picture tube. Rough handling may cause it to implode due to atmospheric pressure. (14.7 lbs per sq. in.). Do not nick or scratch the glass or subject it to any undue pressure. When handling, usesafety goggles and heavy gloves for protection. Discharge the picture tube by shorting the anode to chassis ground (not to the cabinet or to other mounting hardware). When discharging connect cold ground (i.e. dag ground lead) to the anode with a wellinsulated wire or use a grounding probe.Avoid prolonged exposure at close range to unshielded areas of the picture tube to prevent exposure to x ray radiation.

The test picture tube used for servicing the chassis at the bench should incorporate safety glass and magnetic shielding. The safety glass provide shielding for the tube viewing area against x ray radiation as well as implosion. The magnetic shieldlimits the x ray radiation around the bell of the picture tube in addition to the restricting magnetic effects. When using a picture tube test jig for service, ensure that the jig is capable of handling 50kV without causing x ray radiation.

Before returning a serviced receiver to the owner, the service technician must thoroughly test the unit to ensure that is completely safe to operate. Do not use a line isolation transformer when testing.

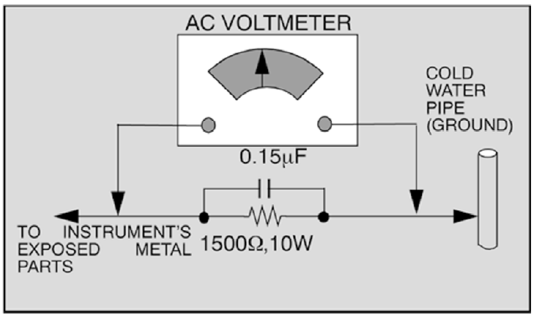
Leakage current cold check

Unplug the A.C. cord and connect a jumper between the two plug prongs.Measure the resistance between the jumpered AC plug and expose metallic parts such as screwheads, antenna terminals, control shafts, etc. If the exposed metallic part has a returnpath to the chassis, the reading should be between 240kΩ and 5.2MΩ . If the exposed metallic part does not have a return path to the chassis, the reading should be infinite.

Leakage current hot check

Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during the check.
Connect a 1.5kΩ 10 watt resistor in parallel with a 0.15 μ F capacitor between an exposed metallic part and ground. Use earth ground, for example a water pipe.
Using a DVM with a 1000 ohms/volt sensitivity or higher, measure the AC potential across the resistor.
Repeat the procedure and measure the voltage present with all other exposed metallic parts. Verify that any potential does not exceed 0.75 volt RMS. A leakage current tester (such a Simpson model 229, Sencore model PR57 or equivalent) may be used in the above procedure, in which case any current measure must not exceed 0.5 milliamp. Ifany measurement is out of the specified limits, there is a possibility of a shock hazard and the receiver must be repaired and rechecked before it is returned to the customer.

Hot check circuit



Insulation test

Connect an insulation tester between an exposed metallic part and A.C. line. Apply 1080VAC/ 60Hz for 1 second. Confirm that the current measurement is 0.5mA ~ 2.0mA. Repeat test with other metallic exposed parts.

X ray radiation

WARNING
The potential source of x ray radiation in the TV set is in the high voltage section and the picture tube.

NOTE
It is important to use an accurate, calibrated high voltage meter.

Set the brightness, picture, sharpness and color controls to minimum.
Measure the high voltage. The high voltage should be 30.55 ± 1.25kV. If the upper limit is out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature component failure.

Horizontal oscillator disable circuit test

This test must be performed as a final check before the receiver is returned to the customer.
See horizontal oscillator disable circuit procedure check in this manual.

2. Service notes

NOTE
These components are affixed with glue. Be careful not to break or damage any foil under the component or at the pins of the ICs when removing. Usually applying heat to the component for a short time while twisting with tweezers will break the component loose.

Leadless chip component (surface mount)

Chip components must be replaced with identical chips due to critical foil track spacing. There are no holes in the board to mount standard transistors or diodes. Some chips capacitor or resistor board solder pads may have holes through the board,however the hole diameter limits standard resistor replacement to 1/8 watt. Standard capacitor may also be limited for the same reason. It is recommended that identical components be used.
Chip resistor have a three digit numerical resistance code, 1st and 2nd significant digits and a multiplier. Example: 162 = 1600 or 1.6k Ω resistor, 0 = 0 Ω (jumper).
Chip capacitors generally do not have the value indicated on the capacitor. The color of the component indicates the general range of the capacitance.
Chip transistors are identified by a two letter code. The first letter indicates the type and the second letter, the grade of transistor.
Chip diodes have a two letter identification code as per the code chart and are a dual diode pack with either common anode or common cathode. Check the parts list for correct diode number.

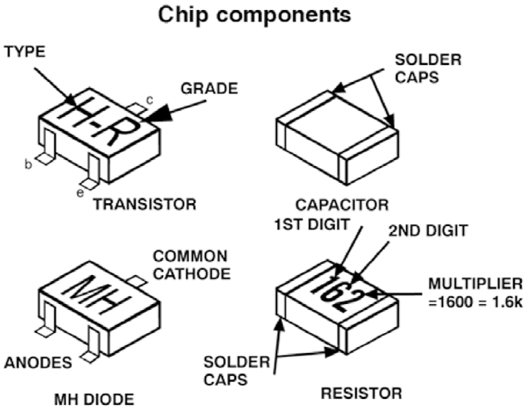
Component removal

1. **Use solder wick to remove solder from component end caps or terminal.**
2. **Without pulling up, carefully twist the component with tweezers to break the adhesive.**

3. Do not reuse removed leadless or chip components since they are subject to stress fracture during removal.

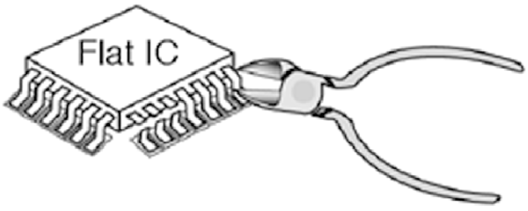
Chip component installation

1. Put a small amount of solder on the board soldering pads.
2. Hold the chip component against the soldering pads with tweezers or with a miniature alligator clip and apply heat to the pad area with a 30 watt iron until solder flows. Do not apply heat for more than 3 seconds.

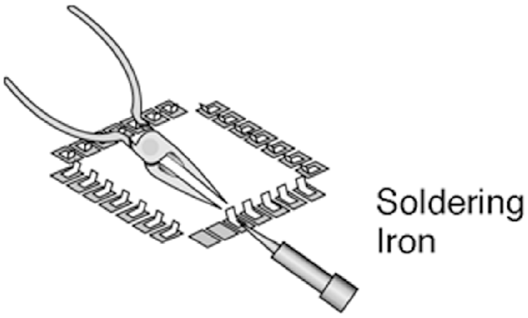


How to replace flat IC (required tools)

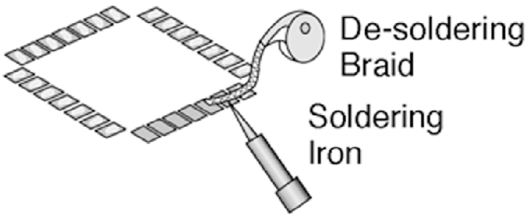
1. Remove the solder from all of the pins of a Flat IC by using a desolder braid



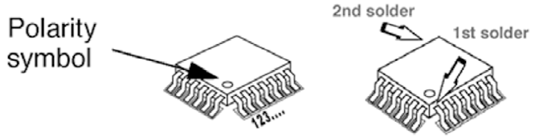
2. Put the iron wire under the pins of the Flat IC and pull it in the direction indicated while heating the pins using a soldering iron. A small awl can be used instead of the iron wire.



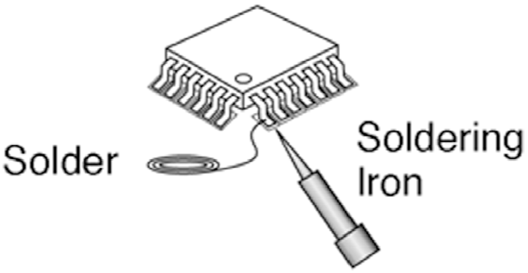
3. Remove the solder from all the pads of the Flat IC by using a de solder braid



4. Position the new Flat IC in place (apply the pins of the Flat IC to the soldering pads where the pins need to be soldered). Properly determine the positions of the soldering pads and pins by correctly aligning the polarity symbol



5. Solder all pins to the soldering pads using a fine tipped soldering iron



6. Check with a magnifier for solder bridge between the pins or for dry joint between pins and soldering pads. To remove a solder bridge, use a de solder braid as shown in the figure below

IMPORTANT
To protect against possible damage to the solid state devices due to arching or static discharge, make certain that all ground wires and CRT DAG wire are securely connected.

CAUTION

The power supply circuit is above earth ground and the chassis cannot be polarized. Use an isolation transformer when servicing the receiver to avoid damage to the test equipment or to the chassis. Connect the test equipment to the proper ground(hot) or (cold) when servicing, or incorrect voltages will be measured.

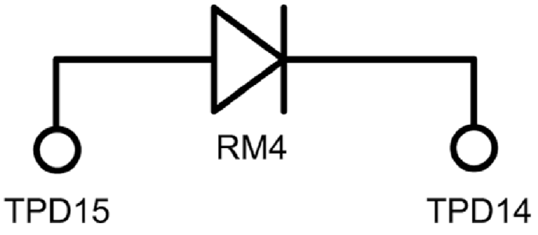
2.1. X-Ray Protection Circuit Check& Adjustments

This test must be performed as final check before the receiver is returned to the customer. If voltages are out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature componentfailure.

Equipment:

1. **Isolation transformer.**
2. **High voltage meter.**
3. **D.C. Ammeter**
4. **Short jumper.**
5. **HHS jig (See figure below).**

Diode Connection Jumper.



Preparation:

1. **Make sure the receiver is turned off.**
2. **Connect the receiver to an isolation transformer.**
3. **Connect the ammeter serial from the flyback anode lead to the picture tube anode socket.**

4. Prepare short jumper and HHS jig.

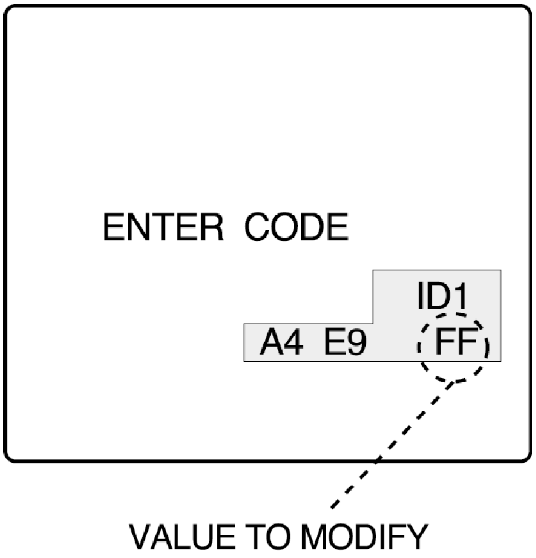
Procedure:

1. **Connect the short jumper between TPD16 & TPD17.**
2. **Connect the jumper diode between TPD14 and TPD15 (anode connected to TPD15 and cathode to TPD14).**
3. **Apply 75VAC to AC input of isolation transformer.**
4. **Turn the receiver on.**
5. **Apply a monoscope pattern.**
6. **Set customer picture and brightness controls to the minimum.**
7. **Set current within 50 μ A to 100 μ A by changing the picture and bright controls.**
8. **Slowly increase AC voltage at the input of the isolation transformer and confirm HHS voltage measure 34.5kV.**
9. **Turn power off and remove jigs.**

3. EEPROM replacement

If a new EEPROM integrated circuit is replaced for servicing, follow the next procedure once that the memory is properly assembled:

1. **Enter to service mode.**
2. **Turn the TV set ON.**
3. **Once inside service mode the first image that appears on-screen is the ID1 register with the respective address value (FF) like the image below.**
   Note:
   All 3 registers (ID1,ID2,ID3) should appear with FF values if a new EEPROM is assembled.



4. With "VOL" keys adjust the correct value according with the service adjustment table (see "Service Mode" section).

5. Change to the next ID switch register with "CH" keys and repeat the same procedure as step 4.

6. When replacing a new EEPROM be sure to set the correct ID switch values for each model.

7. Once that all 3 registers are set with the correct address value, perform all of the remaining adjustments and servicing.

IMPORTANT:

Correct ID switch configuration should be input when replacing EEPROM for each television model, otherwise if wrong values are configured, the television software will not function accordingly and properly.

4. About lead free solder (PbF)

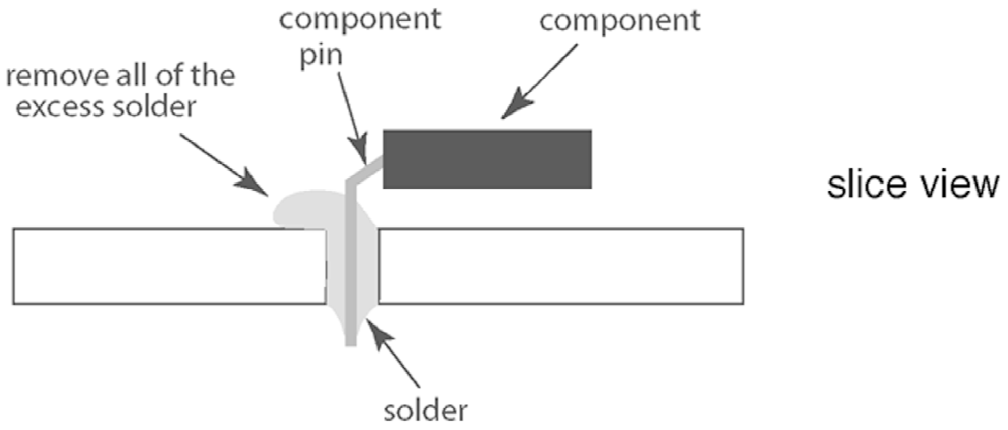
NOTE

Lead is listed as (Pb) in the periodic table of elements. / In the information below, Pb will refer to lead solder, and PbF will refer to Lead Free Solder. / The lead free solder used in our manufacturing process and discussed below is (Sn+Ag+Cu). / Thatis Tin (Sn), Silver (Ag) and Copper (Cu) although other types are available.

This model uses Pb Free solder in it's manufacture due to environmental conservation issues. For / service and repair work, we'd suggest the use of Pb free solder as well, although Pb solder may be / used. / PCBs manufacturedusing lead free solder will have the "PbF" or a leaf symbol stamped on the / back of PCB.

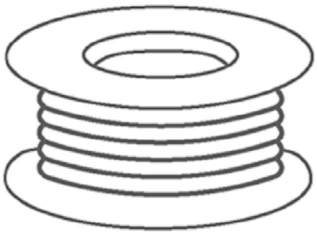
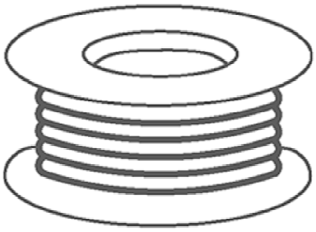
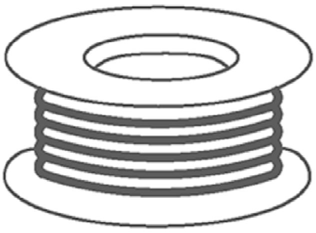
CAUTION

- Pb free solder has a higher melting point than standard solder. Typically the melting point is 50 ~ 70 °F (30 ~ 40 °C) higher. Please use a high temperature soldering iron and set it to 700 ± 20 °F (370 ± 10 °C).
- Pb free solder will tend to splash when heated too high (about 1100 °F or 600 °C). / If you must use Pb solder, please completely remove all of the Pb free solder on the pins or solder area before applying Pb solder. If thisis not practical, be sure to heat the Pb free solder until it melts, before applying Pb solder.
- After applying PbF solder to double layered boards, please check the component side for excess solder which may flow onto the opposite side.



Suggested Pb free solder

There are several kinds of Pb free solder available for purchase. This product uses Sn+Ag+Cu (tin, silver, copper) solder. However, Sn+Cu (tin, copper), Sn+Zn+Bi (tin, zinc, bismuth) solder can also beused.

0.3mm X 100g	0.6mm X 100g	1.0mm X 100g
		

5. Receiver feature table

FEATURE/MODEL	CT-27SL13G/UG	CT-27SL33G/UG
CHASSIS	BP405	DP405
MICRO	128K	
MENU LANGUAGE	ENG/SPAN/FR	
CLOSED CAPTION	X	
V-CHIP (USA/CANADA)	X	
CHANNEL COUNT	181	
PIP (1T), 2T PIP (2T), 2T SPLIT	not available	2T
CHANNEL INFO BANNER	X	
VIDEO INPUT SKIP	SKIP	
75 OHM INPUT	X	
REMOTE CONTROL	EUR7613Z60	EUR7713Z70
CRT SUPPLIER	SAMSUNG (FLAT)	
FAMILY	NA10	
COMB FILTER	3 DIG	
HEC/VEC (X=BOTH)	X	
VM	X	
V/A NORM (X=BOTH)	V	
COLOR TEMP	X	
PRESET/INPUT LABELING	X	
VIDEO INPUT PICTURE MEMORY	X	
MTS/SAP/DBX	X	
BUILT-IN AUDIO POWER	5Wx2	
No. OF SPEAKERS	2	
BASS/BAL/TREBLE CONTROL	X	
AI SOUND	X	
SURROUND	X	
SPATIALIZER/BBE	BBE	
A/V IN (REAR/FRONT)	3(2/1)	
AUDIO OUT (FAO: F, VAO: V)	F, V	
COMPONENT INPUT (Y, Pb, Pr)	1	
S-VIDEO INPUT (REAR/FRONT)	1/0	

FEATURE/MODEL	CT-27SL13G/UG	CT-27SL33G/UG
EPJ/HPJ/MISC	HPJ	
DIMENSIONS(WxDxH)	754.3x534.3x601.6mm29.69x21.04x23.69in	665.1x544.3x594.8mm26.18x21.43x23.41in
WEIGHT (Kg/Lbs)	35.4/78.04	34.5/76.05

Note:
Specifications are subject to change without notice or obligation. Dimensions and weights are approximate.

6. Board description table

CT-27SL13G / CT-27SL13UG

BOARD	PART NUMBER	DESCRIPTION
A	TNP2AH047HB	MAIN BOARD
C	TNP2AA157AK	CRT BOARD

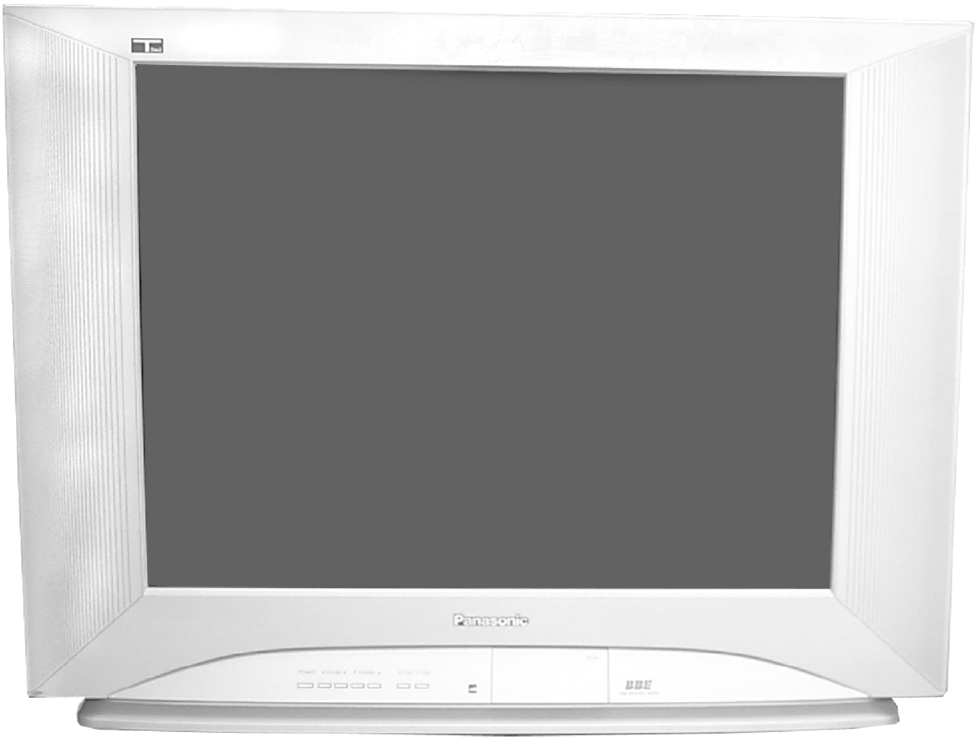
CT-27SL33G / CT-27SL33UG

BOARD	PART NUMBER	DESCRIPTION
A	TNP2AH047HC	MAIN BOARD
C	TNP2AA157AK	CRT BOARD
Y	TNP2AA123	PIP BOARD

NOTE
When ordering a replacement board assembly, append an “S” to the board number

EXAMPLE
To order the A Board, for CT-27SL13G the replacement board is TNP2AH047HBS.

7. TV Location of controls

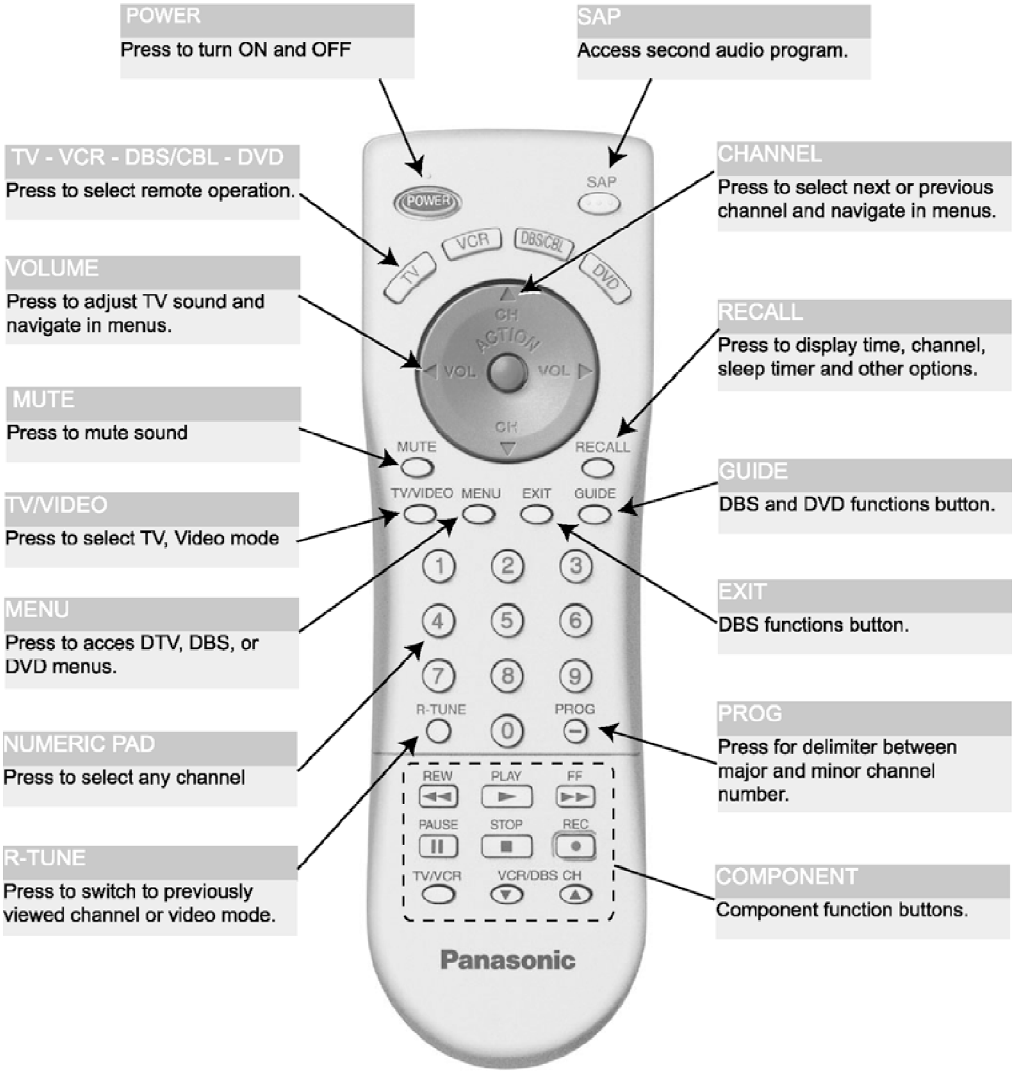


Front controls are inside the front door

	Quick reference control operation
1	**Power** - Press to turn ON or OFF.
2	**Volume** - Press to adjust sound level, or to adjust audio menus, video menus, and select operating features when menus are displayed
3	**Channel** - Press to select programmed channels. Press to highlight desired features when menus are displayed. Also use to select cable converter box channels after programming remote control infra-red codes (the TV/AUX/CABLE switch must be set in CABLE position).
4	**Action** - Press to display main menu and access on screen feature and adjustment menus.
5	**TV/Video** - Press to select TV or one of the video inputs, for the main picture or the PIP frame (when PIP frame is displayed).

8. Location of controls (remote)

8.1. EUR7613Z60



Note:
For additional information about this remote please refer to the owner's manual section remote operation, listed on the parts list section.

8.2. EUR7613Z70

POWER
Press to turn ON and OFF.

TV - VCR - DBS/CBL - DVD
Press to select a component.

MUTE
Press to mute sound.

TV/VIDEO
Press to select TV, Video mode.

MENU
Press to select TV, Video mode.

KEYBOARD
Press to select any channel.

R-TUNE
Press to switch to previously viewed channel or video mode.

SAP
Press to acces the secondary audio program broadcast.

CH
Press to select next or previous channel and navigate in menus.

VOL
Press to adjust TV sound and navigate in menus.

RECALL
Press to display time, channel sleep timer and other options.

GUIDE
DBS and DVD functions button.

EXIT
DBS menu function button.

PROG
Press for delimiter between major and minor channel number.

PIP KEYPAD
Press to access PIP features.

Note:
For additional information about this remote please refer to the owner's manual section remote operation, listed on the parts list section.

9. Dissasembly for service

Back cover
Remove all the screws marked with an arrow (←) from the back of the receiver

NOTE
Screw configuration, type, and number of screws vary depending on the model of the receiver serviced and the application; various models are covered in this manual. Use same hardware when reassembling the receiver.

- 3 screws at the top edge of the receiver.
- 1 screw by the A/V jacks.
- 1 screw at each lower corner of the receiver.
- 1 screw by the Flyback.

A-Board - Main chassis

1. Slide the chassis completely out of the guide rails.

2. Stand the receiver on its edge. The underside of the board is completely accessible for component replacement.

Note:
Some tie-wraps that secure the wire dressings may need to be unfastened for chassis removal.

Y-Board - Second tuner board

1. This bard in connectet to A-Board.

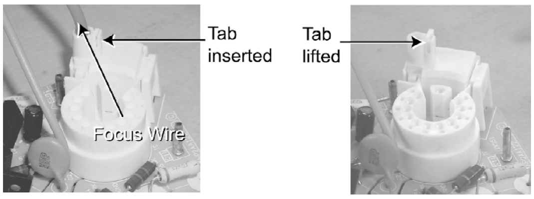
2. To pull out slide the board along with the A-Board.

Note:
Some tie-wraps that secure the wire dressings may need to be unfastened for chassis removal.

C-Board - CRT output

The board plugs onto the socket on the CRT neck. To release the Focus wire, use a dull object to release the tab on the socket (near the wire opening) and carefully pull on the wire. To connect the focus wire, press on the tab to lock it then insertthe wire in the opening and press on it until it is fully inserted and locked in place.

Focus cable release



Speakers
Each speaker is secured to the cabinet with 4 screws.

NOTE
When reassembling speakers be sure to connect the speaker wires to the correct speaker lead (+) (-)

9.1. Disassembly for CRT replacement

1. Discharge the CRT as instructed in the "safety precautions".

2. Disconnect the yoke (DY) plug, degaussing coil (DEG) plug from the main board.
3. Unplug the CRT 2nd anode button from the main board.
4. Remove the C-Board from the CRT base and unplug the black wires (CRT dag ground) C11 & C21.
5. Disconnect the speakers plug from the A-Board.
6. Lift the main chassis (A-Board) and all mounted boards completely out with the CRT board attached.
7. Perform complete removal of chassis, as instructed in “disassembly for service” section.

CRT replacement

1. Perform “disassembly for CRT replacement” procedure.
2. Insure that the CRT H.V. Anode button is discharged before handling the CRT. Read the “safety precautions” section on handling the picture tube.
3. Remove the components from the CRT neck and place the cabinet face down on a soft pad.
4. Note the original order for the CRT mounting hardware as they are remove from the CRT mounting brackets at each corner of the CRT.
5. Remove the CRT with the degaussing coil and the dag ground braid attached.
6. Note the original locations and mounting of the degaussing coil and the dag ground assembly to insure proper reinstallation on the replacement CRT.
   To remove and remount the degaussing coil:
   - Unhook the coil spring from the bottom corners of the CRT ears.
   - Release the braid loop from the upper corners of the CRT ears.
7. Mount the dag ground braid on the replacement CRT. Position the degaussing coil with new ties.

Dress coil as was on the original CRT.

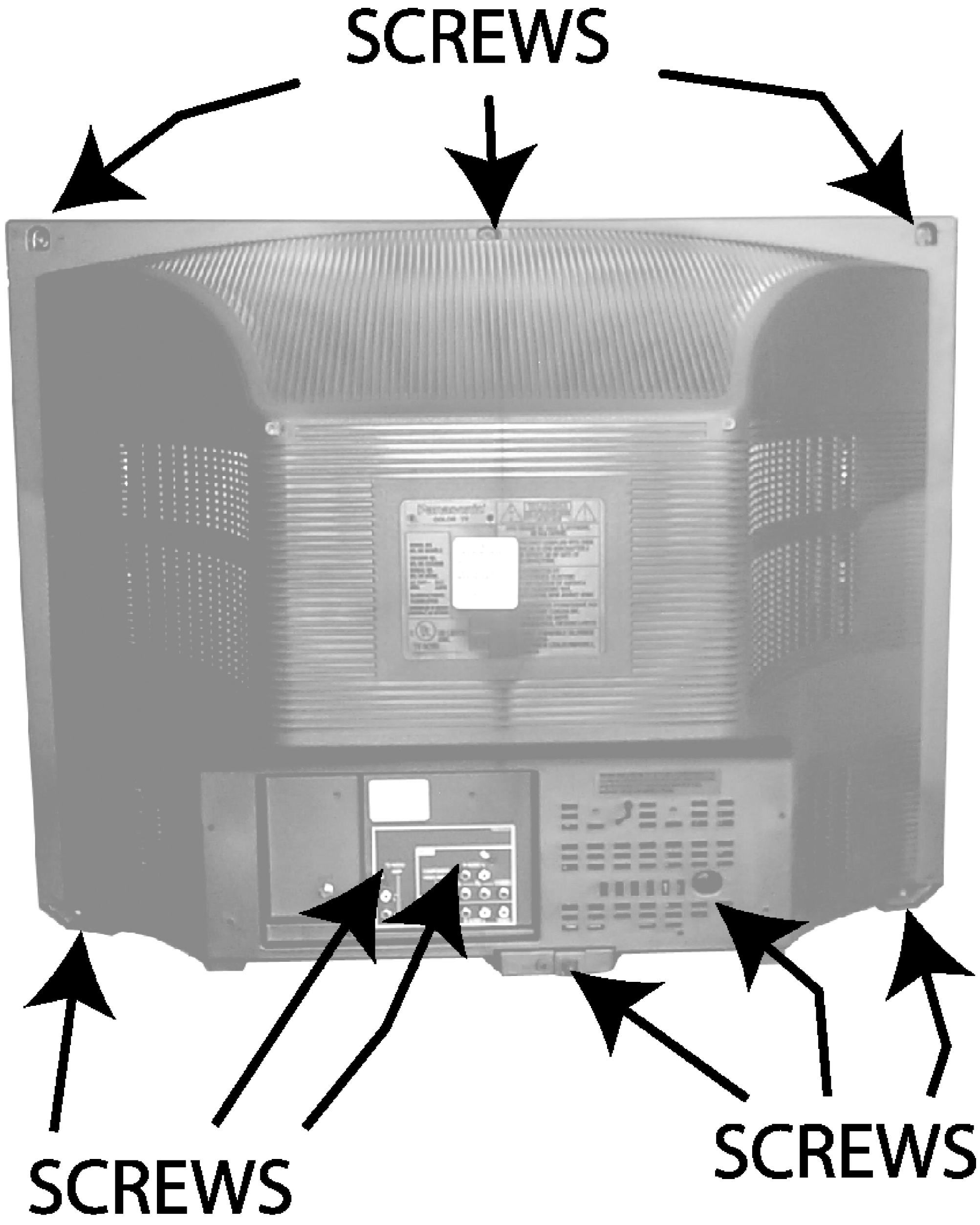
8. Replace the components on CRT neck and reinstall into cabinet. Verify that all ground wires and circuit board plugs get connected.

IMPORTANT NOTICE

When ordering the CRT, please order CRT and CRT kit also. Please see parts list section for part numbers.

9.2. Back cover removal

Back Cover (appearance may vary)



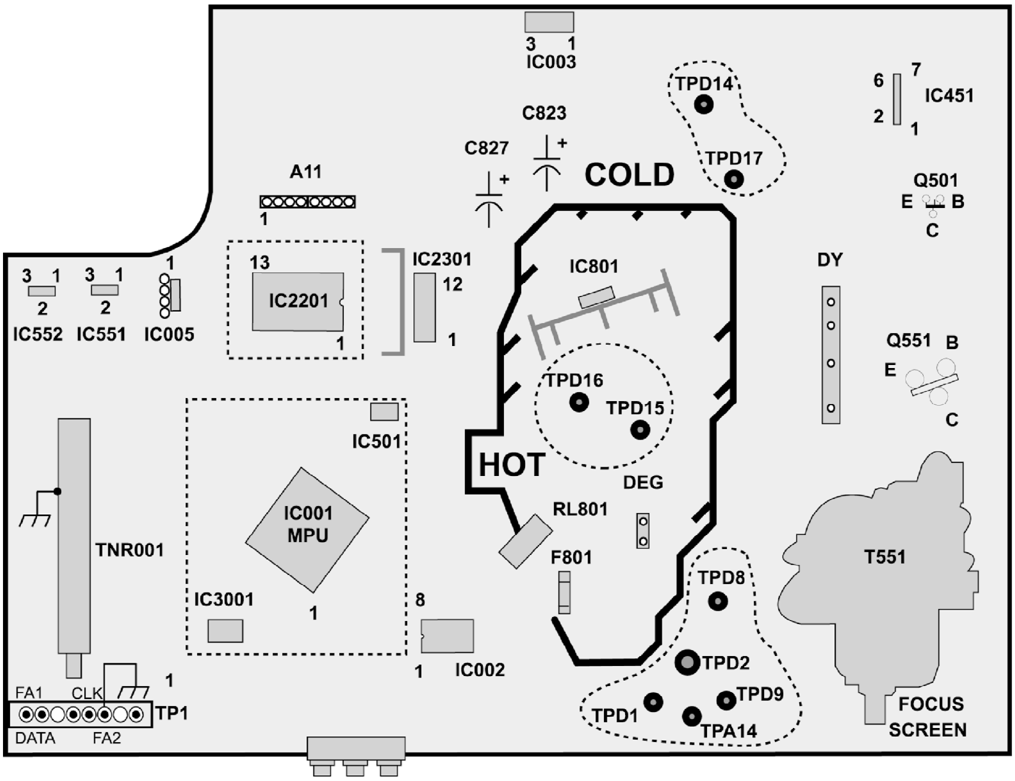
10. Chassis service adjustment procedures

All service adjustments are factory preset and should not require adjustment unless controls and/or associated components are replaced.

Note:

Connect the (-) lead of the voltmeter to the appropriate ground. Use IC801's heat sink when the HOT ground symbol is used. Otherwise, use COLD ground (tuner shield, IC451's heat sink or FA2).

Component and voltage test points



Note:

Components and test points within doted areas are located on trace side.

B+ voltage check

1. **Set the BRIGHT and PICTURE to minimum by using the PICTURE menu.**
2. **Connect the DVM between C825 (+ side) or TPD14 and cold ground.**
3. **Confirm that B+ voltage is 131.0V ± 2.0V. This voltage supplies B+ to the horizontal output and flyback circuits.**

Source voltage chart

120V AC line input. Set the BRIGHT and the PICTURE to minimum by using the PICTURE menu.

Use cold or hot ground for the (-) lead of the DVM as needed.

A-BOARD	TEST POINT	VOLTAGE	
		MDDA CRT	SAMSUNG CRT
+B2	TPD14	131.0 ± 2.0V	131.0 ± 2.0V
SOUND	C823 (+)	22.7 ± 1.0V	22.7 ± 1.0V
STB12V	C827 (+)	12.8 ± 1.0 V	12.8 ± 1.0 V
220V	TPA14	217 ± 10 V	220 ± 10 V
VERTICAL	TPD8	27.4 ± 1.5V	25.4 ± 1.5V
9V	IC551 pin 3	9.0 ± 0.5V	9.0 ± 0.5V
5V	IC552 pin 3	5.0 ± 0.5V	5.0 ± 0.5V
3.3V	IC005 pin 2	3.3 ± 0.3V	3.3 ± 0.3V
EHT	CRT anode	29.25 ± 1.25kV	30.55 ± 1.25kV
HEATER	JK351 H-HGND	6.0 ± 0.24V	6.3 ± 0.24V

High voltage check

1. **Select an active TV channel and confirm that horizontal is in sync.**
2. **Adjust BRIGHTNESS and CONTRAST using PICTURE icon menu so video just disappears.**
3. **Using a high voltage meter confirm that the high voltage is 30.55 ± 1.25kV.**

11. Service mode (electronic adjustments)

This receiver has electronic technology using the IC bus concept. It performs as a control function and it replaces many mechanical controls. Instead of adjusting mechanical controls individually, many of the control functions are now performedby using "on screen display menu". (The service adjustment mode).

NOTE
It is suggested that the technician reads all the way through and understand the following procedure for entering/exiting the service adjustment mode; then proceed with the instructions working with the receiver. When becoming familiarwith the procedure, the flow chart for service mode may be used as a quick guide.

Quick entry to service mode

When minor adjustments need to be done to the electronic controls, the method of entering the service mode without removal of the cabinet back is as follows using the remote control:

1. **Select SET-UP icon and select CABLE mode.**
2. **Select TIMER icon and set SLEEP time for 30 Min.**

3. **Press "ACTION" twice to exit menus.**
4. **Tune to the channel 124.**
5. **Adjust VOLUME to minimum (0).**
6. **Press VOL →(decrease) on receiver. Red "CHK" appears in upper corner.**

To toggle between aging and service modes:
While the "CHK" is displayed on the left top corner of the CRT, pressing "ACTION" and "VOL" UP on the TV simultaneously will toggle between the modes. Red "CHK" for serviceand yellow "CHK" for aging.

7. **Press POWER on the remote control to display the service adjustment modes menu, select adjustment by pressing the volume right/left buttons and channel up/down buttons on the remote and ACTION to enter the adjustment.**

MTS	MTSIN	SEPAL	SEPAH	
CLOCK	CLOCK			HHSTH
VIDEO	COLOR	TINT	BRIGHT	CONT
	B-Y_G	CUT_G	CUT_R	CUT_B
	BRT	R-DR	B-DR	
PIP	PCONT			
HDEF	H-POS	H-WID	PCC	
	TOPG	BTMG	TRAP	
FINE	PCCHG	PCCLG	PCCHS	PCCLS
	TOPSL	BTMSL		
VDEF	VEAMP	V-C	V-S	VPOS
SETID	ID1	ID2	ID3	

Exiting the service mode:
This TV goes out from service mode when it is unplugged or turned OFF. To exit the service mode, turn the TV OFF from or unplug the TV from A.C.

Other method
Press ACTION and POWER on the receiver simultaneously for at least 2 seconds.
The receiver momentarily shuts off; then comes back on tuned to channel 3 with a preset level of sound.
Any programmed channels, channels caption data and some others user defined settings will be erased when exited by pressing ACTION and POWER on receiver.

IMPORTANT NOTE
Always check that the TV exits the service mode.

To confirm colors

When in service mode (red "CHK" is displayed) press RECALL on the remote control to enter the purity field check mode

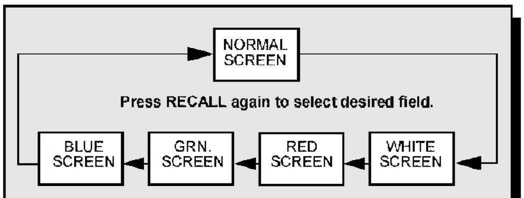


Figure 1. Purity check field mode.

Entering service mode (open-back method)

While the receiver is connected and operating in normal mode, momentarily short test point FA1 (TP1 pin 2) to cold ground (TP1 pin 3).
The receiver enters the aging mode.
Yellow letters "CHK" appear in the upper left corner of the screen. / (The volume right/left and channel up/down will adjust rapidly).

Note:

If service mode is accessed by this method be sure to reset the set after service is performed.

11.1. Service adjustment default values for items

NAME	DESCRIPTION	REGISTER VALUE	
		CT-27SL33G/UG/MG/ MUG	CT-27SL13G/UG/M MUG
MTSIN	MTS INPUT LEVEL	25	
SEPAL	MTS LOW LEVEL SEPARATION	08	
SEPAH	MTS HIGH LEVEL SEPARATION	1D	
CLOCK	CLOCK	128	
HHSTH	HHS VOLTAGE LEVEL REFERENCE	9B	
COLOR	COLOR	00 F0	
TINT	TINT	56	
BRIGH	SUB-BRIGHTNESS	5A	
CONT	SUB-CONTRAST	70	
B-Y_G	MAGENTA TINT ADJ	80	
CUT_G	GREEN CUT-OFF	02 6F	
CUT_R	RED CUT-OFF	02 62	
CUT_B	BLUE CUT-OFF	02 8C	
BRT	BRIGHT	5A	
R-DR	RED DRIVE	09 7F	
B-DR	BLUE DRIVE	08 3D	

NAME	DESCRIPTION	REGISTER VALUE	
		CT-27SL33G/UG/MG/ MUG	CT-27SL13G/UG/M MUG
PCONT	PIP CONTRAST	70	N/A
H-POS	HORIZONTAL POSITION	8E	
H-WID	HORIZONTAL WIDTH	23	
PCC	PINCUSHION	1F	
TOPG	TOP CORNER PINCUSHION	B6	
BTMG	BOTTOM CORNER PINCUSHION	B3	
TRAP	TRAPEZOID	83	
PCCHG	PINCUSHION HIGH	13	
PCCLG	PINCUSHION LOW	10	
PCCHS	PINCUSHION HIGH	00	
PCCLS	PINCUSHION LOW	04	
TOPSL	TOP CORNER PINCUSHION SLICE LEVEL	29	
BTMSL	BOTTOM CORNER PINCUSHION SLICE LEVEL	51	
VEAMP	VERTICAL SIZE	99	
V-C	VERTICAL LINEARITY	53	
V-S	VERTICAL SIZE CORRECTION	12	
VPOS	VERTICAL POSITION	7B	
ID1*	ID SWITCH 1	FF	FC
ID2*	ID SWITCH 2	7F	
ID3*	ID SWITCH 3	7B	

IMPORTANT:

These table values are approximated and could change due to variation of electrical characteristics in each set, except for the ID switch values.

***Note:**

The correspondent ID switch (ID1, ID2, ID3) data configuration should not be modified in any way. If EEPROM circuit needs to be replaced, these ID values should be configured according with this table.

12. Service adjustments (electronic controls)

NOTE

Please correlate with available pattern on all adjustments

12.1. Sub-Brightness and Contrast / Service DAC adjustment (BRIGH, CONT)

Adjustment of this control is important for setting proper operation of customer brightness and

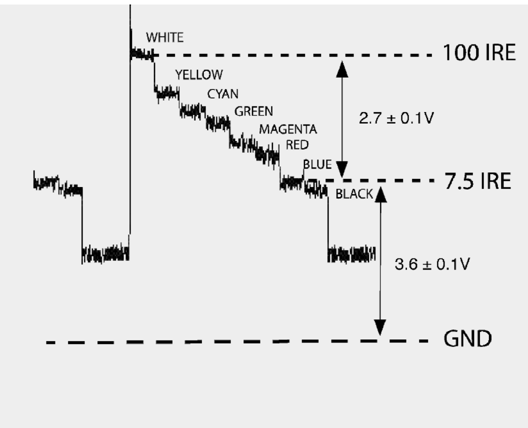
picture controls. Do not adjust the SCREEN VR after the sub-brightness is set.
This adjustment is factory set. Do not adjust unless repairs are made to associated circuit, the CRT Board or when the CRT is replaced.

Preparation

1. **Apply a colorbar pattern.**
2. **Set the PICTURE control to the maximum.**
3. **Set COLOR control to minimum (no color on picture).**
4. **Set the BRIGHTNESS control to the center.**
5. **Set the SHARPNESS control to the center.**
6. **Connect the oscilloscope to TP35.**

Procedure

1. **In the service mode, select DAC for brightness adjustment "BRIGH", and adjust data to obtain 3.6±0.1V between 7.5IRE and GND level at TP35. (See waveform detail).**
2. **In service mode, select DAC for contrast adjustment "CONT", and adjust data to obtain 2.7±0.1V between 7.5IRE and 100IRE level at TP35. (See waveform detail)**



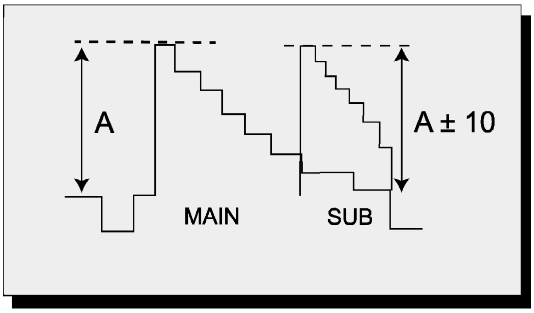
12.2. PIP Sub-contrast (PCONT)

Pocedure:

1. **Apply a colorbar pattern to the main and sub (PIP)**
2. **Select "PCONT" and adjust to 70 so that PIP level is 100±10% of**

the main signal

PIP level;



12.3. Color output adjustment / Service DAC adjustment (COLOR, TINT)

NOTE

if a rainbow pattern generator is available perform the following procedure; the next section describes the procedure with no rainbow pattern.

Make sure that sub-contrast adjustment was finished prior to perform this adjustment.

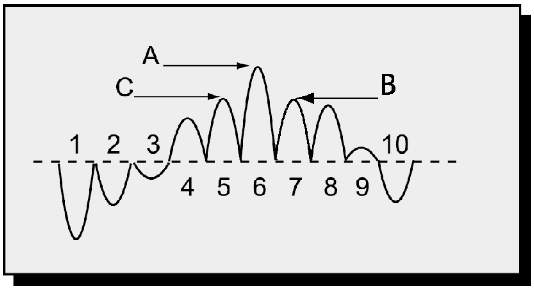
PREPARATION

1. Normalize the picture settings.
2. Set the BRIGHTNESS control to minimum.
3. Set the COLOR control to the center.
4. Set the TINT control to the center.
5. Set the PICTURE control to the maximum.
6. Set the SHARPNESS control to the minimum.

PROCEDURE

1. Apply a rainbow color bar pattern.
2. Connect the oscilloscope to TP37.
3. In service mode adjust “TINT” register until the waveform measured is as the one shown. Tint level from C and B peaks must be almost in the same level and from A to C 0.35 Vpp).

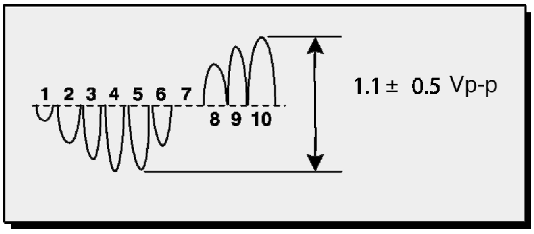
TP37 Waveform.



4. Connect the oscilloscope to TP35 and GND.

5. Adjust “COLOR” register so that the amplitude is 1.1±0.5Vp-p.

TP35 Waveform.



12.4. Color output adjustment / Service DAC adjustment / (COLOR, TINT, B-Y_G)

NOTE
Color and tint adjustment sets the reference settings for the user controls; It is important to read the procedures.

(NO RAINBOW PATTERN)
Make sure that sub-contrast adjustment was finished prior to perform this adjustment

PREPARATION
Normalize the picture settings.

PROCEDURE

1. Apply a color bar pattern.
2. In service mode adjust “R DR” and “B DR” data to “80”.
3. In service mode adjust “TINT” data so that the color does not become greenish or redish.
4. In service mode adjust “COLOR” data so that the color level is not too high (saturated) or too low (tending to black and white).

5. In service mode adjust “B-Y G” data so that blue and green seem natural.
6. Confirm that saturation and picture are normal (normal image).
7. If image is not satisfactory, repeat adjustment until the image is normal and natural.

NOTE
The image can be compared against other set to see the image quality.

12.5. Color temperature adjustment / (B/W Tracking) / Service DAC Adjust. / (CUT R) (CUT G) (CUT B) (R DR) (B DR)

Minor Touch-Up Method

OBSERVE low and high brightness areas of a B/W picture for proper tracking. Adjust only as required for “good gray scale and warm highlights”.

1. LOW LIGHT areas - In service mode for making electronic adjustments, select CUT R, CUT G, CUT B and adjust the picture for gray.
2. HIGH LIGHT areas - In service mode for making electronic adjustments, select drive R DR, B DR and adjust the picture for warm whites.

Complete adjustment

PREPARATION

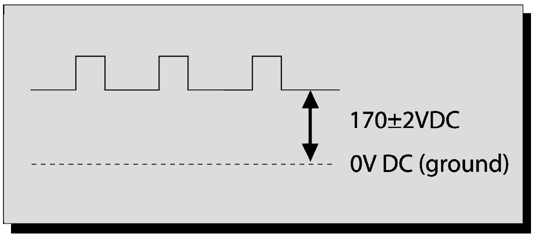
1. Turn the receiver “ON” and allow 30 minutes warm up at WHITE PATTERN.
2. Apply a color bar pattern (with no color).
3. Turn the SCREEN control (part of FBT T551) fully counterclockwise.
4. Preset the following service DACs for best results:

- BRIGH________________________1 D0
- CUT R________________________02 00
- CUT G________________________02 00

- CUT B________________________02 00
- R DR_________________________07 FF
- B DR_________________________07 FF

PROCEDURE

1. Connect the oscilloscope to KG (CRT-Board).
2. In service mode for making electronic adjustment, select “BRIGH” DAC.
3. Press RECALL button on the remote control to collapse the raster. (service SW).
4. Connect oscilloscope to KG on C-Board and adjust service mode “CUT-G” DAC until 170±2V above DC ground is measured
5. Remove the probe from KG.
6. Turn screen clockwise slowly until color is slightly appeared.
7. Then adjust “CUT R” and “CUT B” until line becomes white.
8. Press RECALL button on the remote to restore the raster.
9. Adjust “R DR” and “B DR” so the white seems like white and black like black.
10. Apply a normal signal and confirm that the image is normal and a good gray scale
11. If correction is needed perform minor touch-up method.



12.6. Deflection adjustments

To reset deflection adjustments

To reset deflection adjustments to factory adjusted default, enter to service mode (with red CHK displayed), press POWER button on remote to display the service menu, then press and hold

RECALL button for at least three seconds, a reset messagewill appear in the image.
Use this feature when deflection adjustment gets off adjustment to the point that it cannot be adjusted back easily.

12.6.1. H-Center adjustment

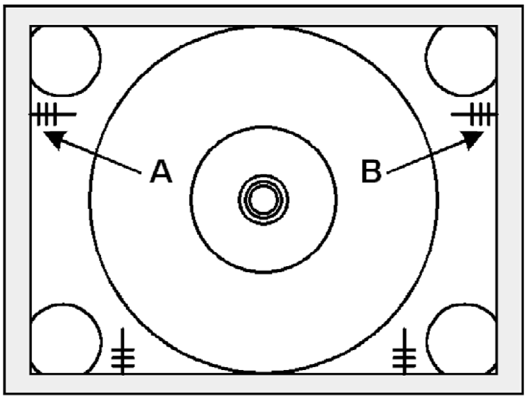
PREPARATION

1. Apply a crosshatch pattern.
2. Normalize the picture settings.

PROCEDURE

1. Apply a pattern that permits to center the picture.

Horizontal Center Adjustment



2. If the horizontal center is not aligned, in service mode adjust “H POS” DATA to adjust the horizontal center of the monoscope pattern to the CRT center.
3. Verify that horizontal width (A & B mark) is within 4.5 ± 0.7.

12.6.2. Vertical linearity(V-C), V-Size and V-Position adjustment

PREPARATION

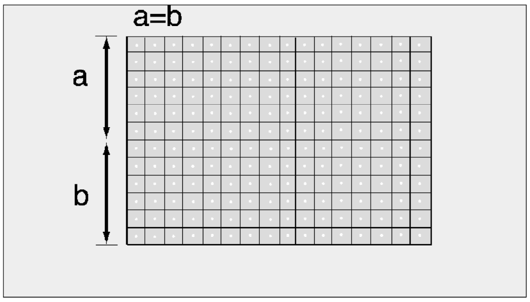
1. Apply a crosshatch pattern
2. Normalize the picture settings.

PROCEDURE

1. Enter service mode, select DAC adjustment / “V-POS” and adjust monoscope pattern to the center vertical position of the CRT

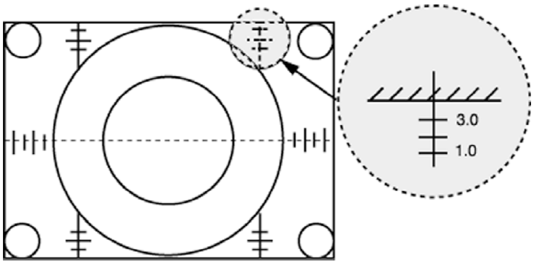
center mark.

2. Adjust linearity data “V-C” so that interval of “a” is same as “b” (a =b).



3. If the v-position is not at the CRT center, adjust / V position “V POS” DATA again.
4. Apply a monoscope pattern.
5. Confirm that center horizontal line is in center mark on CRT.
6. Adjust “VEAMP” register for correct vertical size by making monoscope round circle leaving 4 marks off the CRT edge.

Vertical centering adjustment.



12.6.3. V-S Correction adjustment

PREPARATION

1. Apply a crosshatch pattern
2. Normalize the picture settings.

PROCEDURE

1. Enter to service mode
2. Check a and b sizes, If b-a < -1.5mm (in top & bottom extending

case)

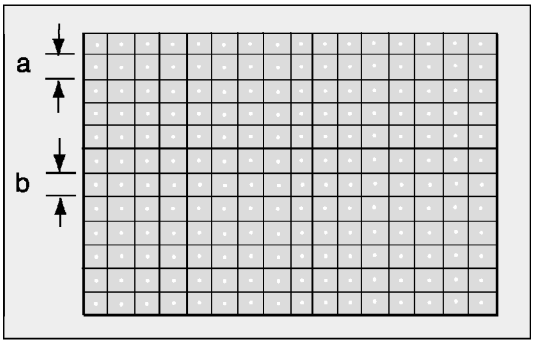
- Increase "V-S" DATA by one step

NOTE

Repeat "a" and "b" until b-a ± 1.5mm

3. Confirm to make outermost circle of monoscope pattern a correct circle

V-Adjustment



12.7. MTS circuit adjustments

The MTS circuit adjustments require two steps:

1. Input level adjustment.

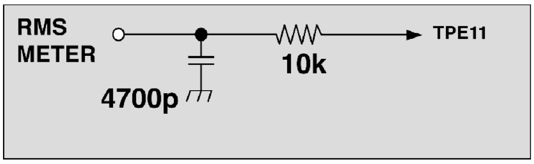
2. Stereo separation adjustment.

Input level adjustment / Service DAC adjustment (MTSIN)

PREPARATION

1. Connect an RMS meter with filter jig as shown in figure to TPE11.

Filter Jig



2. Connect an RF signal generator to the RF antenna input.

PROCEDURE

1. Apply the following signal from the RF signal generator:

   - Video: 100 IRE flat field, 30% modulation.
   - Audio: 300Hz, 100% modulation, monaural (70 ±5dB, 75 Ω OPEN, P/S 10dB). Make sure that the 75 μ s pre-emphasis is OFF.

2. Adjust the MTS input level adjustment “MTSIN” data until the RMS voltage measured is 120 ± 4.0mVrms.

Stereo separation adjustment (SEPAH)

PREPARATION

1. Connect an R.F. signal generator to the RF antenna input.
2. Connect a scope to TPE10.

PROCEDURE

1. Select stereo mode in audio menu
2. Apply the following signal from the RF signal generator:

   - Video: 100 IRE flat field, 30% modulation.
   - Audio: 300Hz, 30% modulation, stereo (left only) (70±5dB, 75 Ω OPEN, P/S 10dB).

   NOTE
   After setting 30% modulation with P.L. SW and N.R. SW OFF, turn P.L. SW and N.R. SW ON.

3. In service mode, adjust the MTS Low-Level separation adjustment “SEPAL” data until the amplitude displayed on the scope is minimum.
4. Apply the following signal from the RF signal generator:

   - Video: 100 IRE flat field, 30% modulation
   - Audio: 3KHz, 30% modulation, stereo (left only) (70 ±5dB, 75 Ω OPEN, P/S 10dB).

NOTE
After setting 30% modulation with P.L. SW and N.R. SW OFF, turn P.L. SW and N.R. SW ON.

5. **Adjust the MTS High-level separation adjustment “SEPAH” until the amplitude displayed on the scope is minimum.**
6. **Repeat above steps 2 through 5 until the amplitude is at minimum for both signals.**

12.8. Clock adjustment (CLOCK)

PREPARATION
Connect the frequency counter from TP017 / (IC001 pin 79) to cold ground

PROCEDURE

1. **Turn the receiver “OFF” with the A.C. power applied.**
2. **Measure TP017 (IC001 pin 79) for the frequency of the waveform and record the reading.**

NOTE

3. **TP017 (IC001 pin 79) measurement must have at least four digits of resolution following the decimal point. Example: 000.0000**
4. **Place the receiver into service mode for making electronic adjustment, select the clock adjustment DAC “CLOCK”.**
5. **Calculate and set “CLOCK” based on the following formula:**

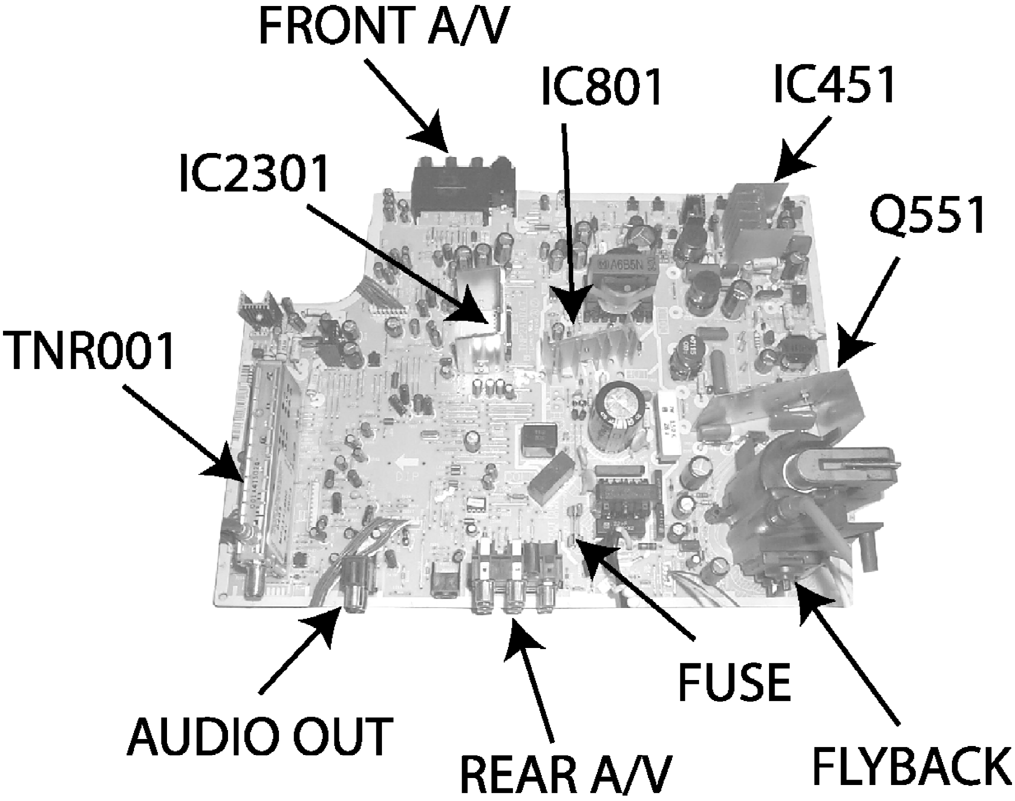
$$CLOCK = 128 - \left[\frac{(TP017_{freq} - 610.35)}{610.35} \times 450000 \right]$$

NOTE
TP017 (IC001 pin 79) measurement will not change regardless of the value stored in CLOCK.

13. Identification of main components

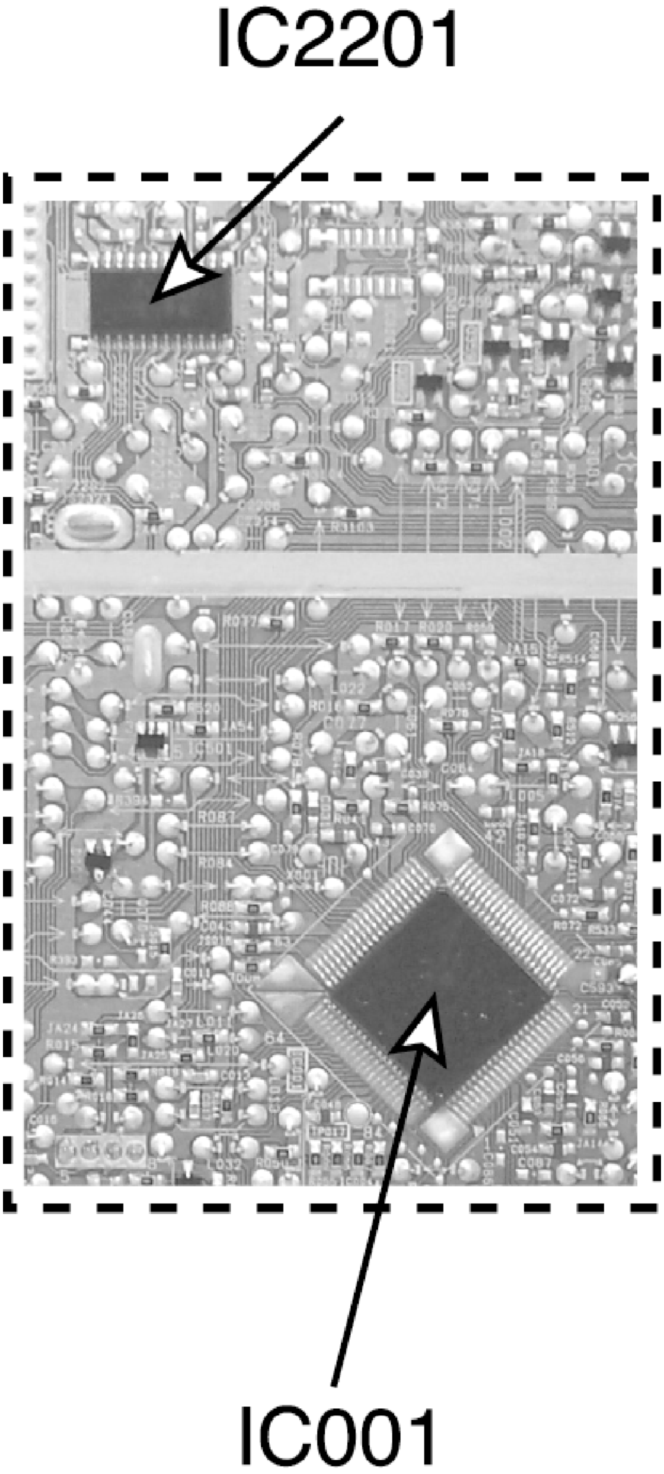
13.1. A-Board main components

A-Board main components



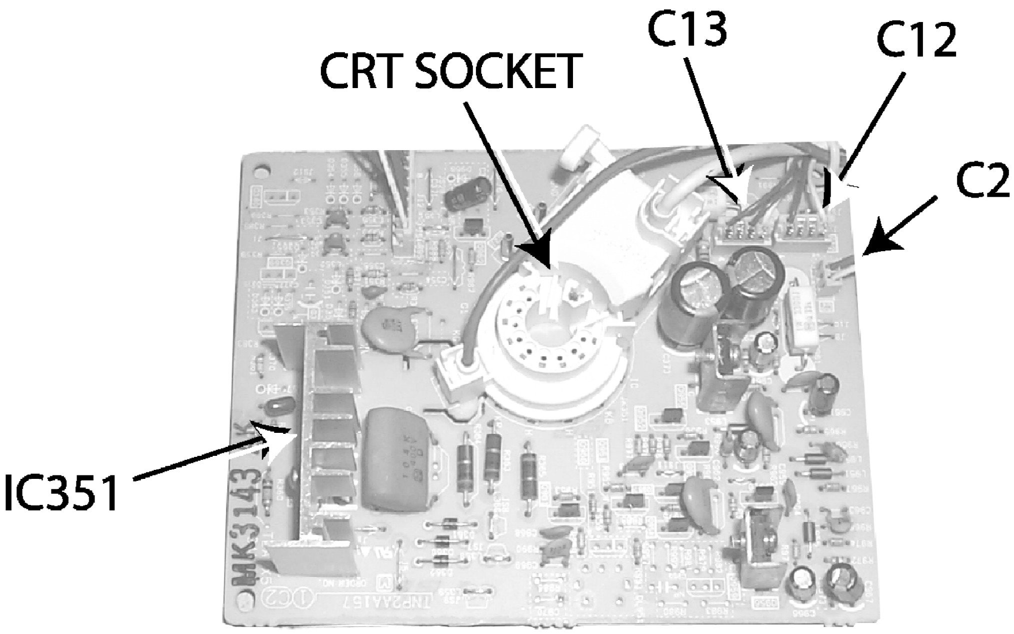
13.2. A-Board surface-mounted components

A-Board (bottom side)



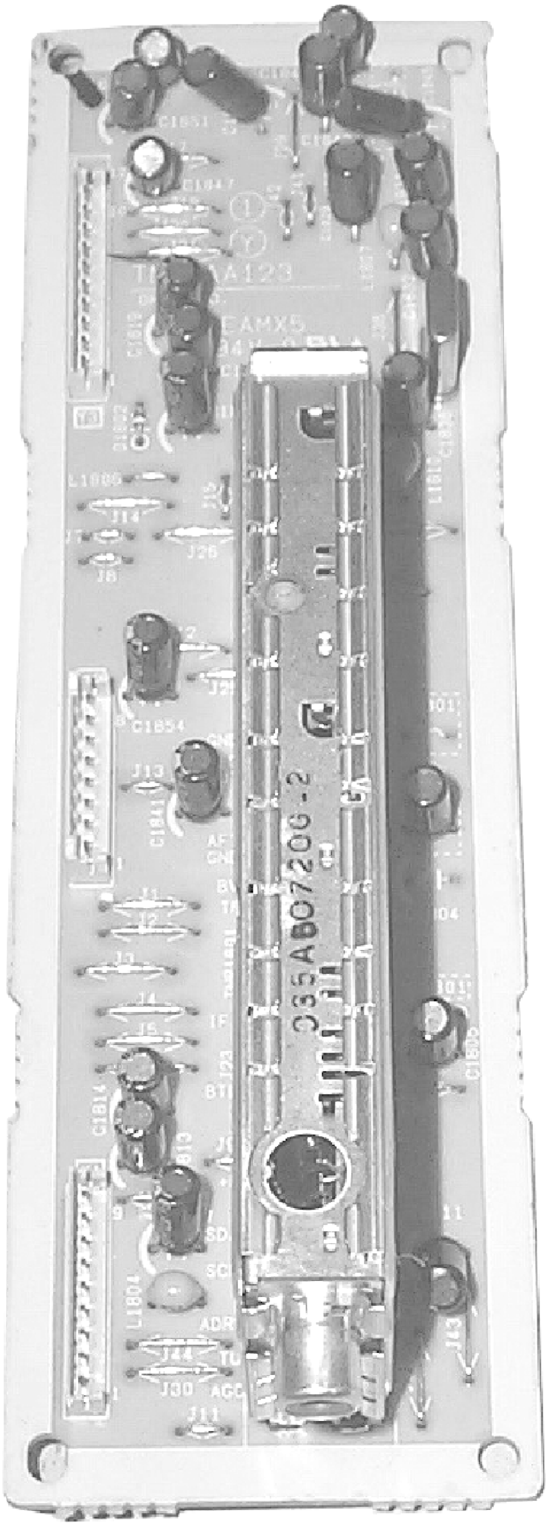
13.3. C-Board main components

C-Board main components



13.4. Y-Board main components

Y-Board main components



14. Reference for PDF colors

DESCRIPTION OF PDF LINK COLORS	
TYPE	DESTINATION
SCHEMATIC	
YELLOW ON IC	IC ON PCB
YELLOW ON CONNECTOR	CONNECTOR ON PCB
YELLOW ON SCHEMATIC	PCB
CYAN	WAVEFORM
GREEN ON SIDE	SCHEMATIC CONTINUED
GREEN ON CONNECTOR	CONNECTOR CONNECTION
BLUE ON IC	VOLTAGE
PCB	
BLUE ON IC	IC ON SCHEMATIC
BLUE ON CONNECTOR	CONNECTOR ON SCHEMATIC
BLUE ON PCB	SCHEMATIC
GREEN ON SIDE	PCB CONTINUED
BLOCK DIAGRAMS	
GREEN ON IC	IC ON SCHEMATIC
GREEN ON SIDE	BLOCK DIAGRAM CONTINUED

15. Conductor views

15.1. A-Board printed circuit (1 of 2)

15.2. A-Board printed circuit (2 of 2)

15.3. C-Board printed circuit

15.4. Y-Board printed circuit

16. Block diagrams

16.1. Video signal block diagram (SL13 models)

16.2. Video signal block diagram (SL33 models)

16.3. Video signal block diagram (SL33 models)

16.4. Audio signal block diagram

17. Schematics

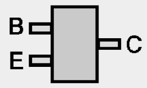
17.1. English schematic notes

Notes:

IMPORTANT SAFETY NOTICE

THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH A ⚠ IN THE SCHEMATIC.

CHIP TRANSISTOR LEAD DESIGNATION



SCHEMATIC NOTES

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value notes is inductance in µH.
4. Test point indicated by ; Test point but no pin .
5. Components indicated with ⚠ are critical parts and replacement should be made with manufacture specified replacement parts only.
6. ▬ (**BOLD LINE**) indicates the route of B+ supply.
7. The schematic diagrams are current at the time of printing and are subject to change without notice.
8. Ground symbol ⏚ indicates **HOT GROUND CONNECTION**; ⏚ indicates COLD GROUND.

NOTE: All other component symbols are used for engineering design purposes.

VOLTAGE MEASUREMENTS

1. Voltage measurement:
   - AC input to the Receiver is 120V. NTSC (HD, 1125i & 525P when applicable) signal generator is connected to the antenna of the Receiver. (Color bar pattern of 100 IRE white and 7.5 IRE black.)
   - All Picture and Audio adjustments are set to Normalize.
     TV ANT/CABLE - (Set-Up Menu) in TV/ANT Mode
     Volume - Min.
     TV/Video SW - TV position
     Audio Mode - Stereo
   - Voltage readings are nominal and may vary ±10% on active devices. Some voltage reading will vary with signal strength and picture content.
   - Supply voltages are nominal.
2. Ground symbol ⏚ indicates ground lead connection of meter.
   Incorrect ground connection will result in erroneous readings.

*CAUTION: **Incorrect ground connection of the test equipment will result in erroneous readings.***

WAVEFORM MEASUREMENTS

1. ③ indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
2. Taken with an NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black.)
3. Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to “MIN”.
4. All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak altitudes may vary depending on the type of Oscilloscope used and its settings.
5. Ground symbol ⏚ shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.

CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

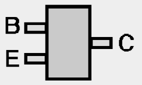
17.2. Notas de esquemáticos en español

Notas

NOTA DE SEGURIDAD

LOS DIAGRAMAS ELÉCTRICOS INCLUYEN CARACTERÍSTICAS ESPECIALES MUY IMPORTANTES PARA LA PROTECCIÓN CONTRA RAYOS-X, QUEMADURAS Y DESCARGAS ELÉCTRICAS. CUANDO SE DE SERVICIO ES IMPORTANTE USAR PARA REEMPLAZO DE COMPONENTES CRITICOS, SOLO PARTES ESPECIFICADAS POR EL FABRICANTES. LOS COMPONENTES CRITICOS ESTAN SEÑALADOS EN LOS DIAGRAMAS POR EL SIMBOLO ⚠.

IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN *CHIP*



NOTAS DE LOS DIAGRAMAS

1. Las Resistencias son de Carbón de 1/4W, a menos que se indique otra característica.
2. Los Capacitores son de Cerámica para 50V, a menos que se indique otra característica.
3. El valor indicado de las Bobinas es la inductancia expresada en µH.
4. Los puntos de prueba en la terminal de algún componente son indicados por . Los puntos de prueba fuera de los componentes se indican con .
5. Los componentes señalados con el símbolo ⚠ son considerados componentes críticos y deben ser reemplazados sólo con las partes especificadas por el fabricante.
6. ▬ (**LINEA GRUESA**) indica las líneas de alimentación de los Voltajes B+.
7. Los diagramas eléctricos están sujetos a cambio sin previo aviso.
8. El símbolo indica que es una conexión a **Tierra Caliente** y el símbolo indica conexión a **Tierra Fría**.

***NOTA:** Los demas símbolos de componentes incluidos son usados con fines de diseño.*

MEDICIÓN DE VOLTAJES

1. Medición de voltaje:
   - El voltaje de entrada al Receptor es de 120V de Corriente Alterna. Un generador de patrones con formato NTSC se conecta a la entrada de la antena. (Patrón de Barras de Colores con 100 IREs para el Blanco y 7.5 IREs para el Negro.)
   - Los ajustes de los Menus Picture y Audio se normalizan.
     En el Menú Set-Up, en la opción ANTENA, se selecciona el modo de CABLE.
     El nivel de Volumen se minimiza.
     De los modos TV y Video, seleccionar el modo TV.
     Seleccionar modo Estereo del Audio.
   - Las mediciones de los voltajes son nominales y pueden variar hasta 10% en componentes en funcionamiento. Las lecturas de los voltajes pueden variar por la potencia de la señal y el contenido de la imagen.
   - Las fuentes de voltajes son nominales.
2. El símbolo indica el tipo de tierra que se utiliza en la conexión del medidor.

***PRECAUCION:** Si no se utiliza la conexión a la tierra adecuada, se obtendrán mediciones equivocadas y podría dañar el equipo de medición.*

MEDICIÓN DE FORMAS DE ONDA

1. Un símbolo como ③ indica el punto para medir una señal. (La medición puede hacerse en el punto con mayor accesibilidad, siempre que sea común al indicado.)
2. Se midieron utilizando un generador con formato NTSC conectado a la terminal de la antena. (Patrón de 8 Barras de Colores EAI, formato NTSC de 100 IREs para el Blanco y 7.5 IREs para el Negro.)
3. Los ajustes de usuario de los Menus PICTURE y AUDIO se normalizaron. Posteriormente el nivel de volumen se ajusta al mínimo.
4. Las formas de onda de Video y Color fueron tomadas con un osciloscopio de banda alta y con un punta de prueba de baja capacitancia (10 a 1). La forma y amplitud de las ondas puede variar según el tipo de osciloscopio que se utilice y sus características.
5. El símbolo de tierra que aparece junto al número de la forma de onda, indica que se utiliza conexión a **Tierra Caliente** en el extremo negativo de la punta de prueba.

***PRECAUCION:** Si no se utiliza la conexión a la tierra adecuada, se obtendrán mediciones equivocadas y podría dañar el equipo de medición.*

17.3. A-Board schematic TNP2AH047HB (1 of 4)

17.4. A-Board schematic TNP2AH047HB (2 of 4)

17.5. A-Board schematic TNP2AH047HB (3 of 4)

17.6. A-Board schematic TNP2AH047HB (4 of 4)

17.7. A-Board schematic TNP2AH047HC (1 of 4)

17.8. A-Board schematic TNP2AH047HC (2 of 4)

17.9. A-Board schematic TNP2AH047HC (3 of 4)

17.10. A-Board schematic TNP2AH047HC (4 of 4)

17.11. C-Board schematic TNP2AA157AK (1 of 2)

17.12. C-Board schematic TNP2AA157AK (2 of 2)

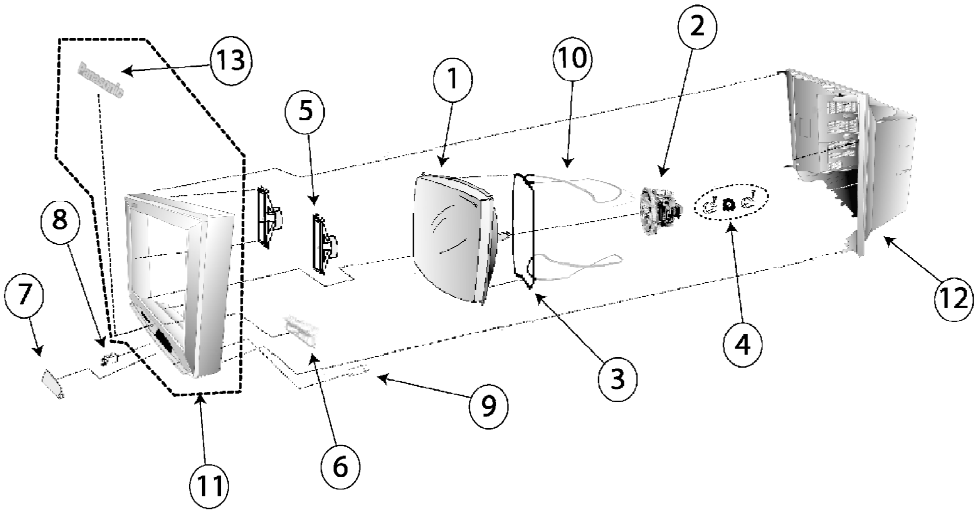
17.13. Y-Board schematic TNP2AA123 (1 of 2)

17.14. Y-Board schematic TNP2AA123 (2 of 2)

17.15. Voltages

17.16. Waveforms

18. Parts location



19. Parts list

19.1. Parts list notes

Important Safety Notice

Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use manufacturer's specified parts.

Abbreviation of part name and description

1. Resistor

Example :
ERD25TJ104 **C** 100KΩ, **J**, 1/4W
Type Allowance

Type	Allowance
C : Carbon	F : ± 1%
F : Fuse	G : ± 2%
M : Metal Oxide Metal Film	J : ± 5% K : ± 10%
S : Solid	M : ± 20%
W : Wire Wound	

2. Capacitor

Example :
ECKF1H103ZF **C** 0.01μF, **Z**, 50V
Type Allowance

Type	Allowance
C : Carbon	C : ± 0.25pF
E : Electrolytic	D : ± 0.5pF
P : Polyester Polypropylene	F : ± 1pF G : ± 3%
T : Tantalum	J : ± 5%
	K : ± 10%
	L : ± 15%
	M : ± 20%
	P : ± 100%, -0%
	Z : ± 80%, -20%

19.2. Parts list

Ref. No.	Part No.	Part Name & Description	Remarks
		CAPRISTORS	
CRA801	TP00842-51	TAPING GAP TERMINAL	⚠
		CAPACITORS	
C003	ECA1HM4R7B	CAP E 4.7UF-50V	
C004	TCJ2VC1H150J	CAP C 15PF-J-50V	
C005	TCJ2VC1H150J	CAP C 15PF-J-50V	
C008	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C009	ECJ2VF1H104Z	CAP C .1UF-Z-50V	
C010	TCJ2VC1H680J	CAP C 68PF-J-50V	
C011	TCJ2VC1H680J	CAP C 68PF-J-50V	
C013	TCJ2VC1H680J	CAP C 68PF-J-50V	
C016	ECA1AM101B	CAP E 100UF-10V	
C017	TCJ2VC1H680J	CAP C 68PF-J-50V	
C018	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C019	ECA0JM102B	CAP E 1000UF-6.3V	
C020	ECA1CM102B	CAP E 1000UF/16V	
C021	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C031	TCJ2VC1H220J	CAP C 22PF-J-50V	
C032	ECA1AM470B	CAP E 47UF-10V	
C034	TCJ2VC1H390J	CAP C 39PF-J-50V	
C035	TCJ2VC1H120J	CAP C 12PF-J-50V	
C038	ECA1CM470B	CAP E 47UF/16V	
C039	TCJ2VB1H221K	CAP C 220PF-K-50V	

Ref. No.	Part No.	Part Name & Description	Remarks
C041	ECA1HM2R2B	CAP E 2.2UF-50V	
C043	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C044	ECA0JM102B	CAP E 1000UF-6.3V	
C046	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C048	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C051	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C052	ECA1CM101B	CAP E 100UF/16V	
C053	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C054	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C055	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C056	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C057	ECEA1CN100UB	CAP E 10UF-16V	
C058	ECEA1CN100UB	CAP E 10UF-16V	
C059	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C060	ECEA1CN220UB	CAP E 22UF-16V	
C061	ECA1HM100B	CAP E 10UF/50V	
C062	ECA1HM100B	CAP E 10UF/50V	
C063	ECJ2VF1C104Z	CAP C .1UF-Z-16V	
C064	ECA1CM101B	CAP E 100UF/16V	
C066	TCJ2VC1H330J	CAP C 33PF-J-50V	
C067	TCJ2VC1H680J	CAP C 68PF-J-50V	
C068	ECA1CM100B	CAP E 10UF-16V	
C070	ECJ2VF1C104Z	CAP C .1UF-Z-16V	
C071	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C072	TCJ2VB1H221K	CAP C 220PF-K-50V	
C073	TCJ2VC1H101J	CAP C 100PF-J-50V	
C077	ECA1HM100B	CAP E 10UF/50V	
C079	TCJ2VC1H220J	CAP C 22PF-J-50V	
C083	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C085	ECJ2VB1C104K	CAP C .1UF-K-16V	
C351	TACCV470T50V	CAP C 47PF/50V	
C352	TACCV330T50V	CAP C 33PF/50V	
C353	TACCV330T50V	CAP C 33PF/50V	
C359	ECA1CM471B	CAP E 470UF-16V	
C359	ECQM4104KZB	CAP P .10UF-K-400V	
C360	ECA1HM4R7B	CAP E 4.7UF-50V	
C368	ECQV1H224JL3	CAP P .22UF-J-50V	
C370	ECKW3D102KBN	CAP C .001UF-K-2KVDC	
C371	ECEA1HN010UB	CAP E 1UF/50V	
C373	ECA2EM470E	CAP E 47UF-250V	
C403	ECEA1CN220UB	CAP E 22UF-16V	
C411	ECQB1H683JF3	CAP P .068UF-J-50V	
C451	ECA1HM010B	CAP E 1UF-50V	
C452	ECA1CM220B	CAP E 22UF-16V	
C454	ECA1VHG101B	CAP E 100UF-35V	
C455	ECA1EM102E	CAP E 1000UF-25V	
C458	ECA1HM010B	CAP E 1UF-50V	
C459	ECA1VHG471E	CAP E 470UF-35V	
C460	ECQB1224KF3	CAP P .22UF-K-100V	
C461	ECQB1104JF3	CAP P .10UF-J-100V	
C462	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C505	ECQB1H104JF3	CAP P .10UF-J-50V	
C506	ECKR2H102KB5	CAP C 1000PF-K-500V	
C510	ECCR2H100D5	CAP C 10PF-D-500V	

Ref. No.	Part No.	Part Name & Description	Remarks
C512	ECA2CM100B	CAP E 10UF-160V	
C531	ECA1HM4R7B	CAP E 4.7UF-50V	⚠
C540	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C551	ECA1VM471B	CAP E 470UF-35V	⚠
C554	ECKR2H561KB5	CAP C 560PF-K-500V	
C555	ECA2EM220E	CAP E 22UF-250V	⚠
C556	ECA1CM471B	CAP E 470UF-16V	⚠
C557	ECKR2H102KB5	CAP C 1000PF-K-500V	
C560	ECEA1HN010UB	CAP E 1UF/50V	
C561	ECEA1HN010UB	CAP E 1UF/50V	
C562	ECKR2H561KB5	CAP C 560PF-K-500V	
C563	ECWH20752JVB	CAP P 7500PF-J-2KV	⚠
C564	ECWH20472JVB	CAP P 4700PF-J-2KV	⚠
C565	ECKW3D681JBR	CAP C 680PF-J-2KV	⚠
C566	ECKW3D181JBP	CAP C 180PF-J-2KV	⚠
C567	ECQM4473JZW	CAP P .047UF-J-400V	⚠
C569	ECWF2364JSR	CAP P .36UF-J-250V	⚠
C570	ECA1CM221B	CAP E 10UF-16V	
C571	ECA1CM220B	CAP E 22UF-16V	
C572	ECA0JM221B	CAP E 220UF-6.3V	
C573	ECA1CM101B	CAP E 100UF/16V	
C575	ECKR2H471KB5	CAP C 470PF-K-500V	
C593	ECA1CM470B	CAP E 47UF/16V	
C605	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C606	ECA0JM221B	CAP E 220UF-6.3V	
C756	ECKW2H682KB5	CAP P 6800PF-K-500V	
C759	ECQE1395KNB	CAP P 3.95UF-K-100V	⚠
C763	ECKR3A121KBP	CAP C 120PF-K-1KV	
C800	ECKR3A152KBP	CAP C 1500PF-K-1KVDC	
C801	ECKWAE472ZED	CAP C 4700PF-Z-500V	⚠
C802	ECKWAE472ZED	CAP C 4700PF-Z-500V	⚠
C803	ECKWAE472ZED	CAP C 4700PF-Z-500V	⚠
C805	EC0S2DA471BB	CAP E 470UF/160V	⚠
C806	ECQM4103KZW	CAP P .01UF-K-400V	⚠
C808	ECA1HM470B	CAP E 47UF-50V	
C809	ECKR1H152KB5	CAP C 1500PF-K-50V	
C810	ECKR1H471KB5	CAP C 470PF-K-50V	
C812	ECQU2A224MVA	CAP P .22UF-M-250VAC	⚠
C813	ECQU2A153MVA	CAP P .015UF-M-250VAC	⚠
C814	ECQU2A153MVA	CAP P .015UF-M-250VAC	⚠
C820	ECA1CM101B	CAP E 100UF/16V	
C821	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C822	ECKR3A221KBP	CAP C 220PF-K-1KV	
C823	ECA1VM471B	CAP E 470UF-35V	⚠
C824	ECKR3A102KBP	CAP C 1000PF-K-1KV	
C825	EEUMG2C221S	CAP E 220UF-160V	⚠
C826	ECKR3A471KBP	CAP C 470PF-K-1KV	
C827	ECA1CM102B	CAP E 1000UF/16V	
C828	ECA2CHG470E	CAP E 47UF-160V	⚠
C829	ECA1CM471B	CAP E 470UF-16V	

Ref. No.	Part No.	Part Name & Description	Remarks
C830	ECA1CM471B	CAP E 470UF-16V	
C901	TCJ2VB1H103K	CAP C .01UF-K-50V	
C904	ECKR1H103ZF5	CAP C .01UF-Z-50V	
C952	ECA1HM100B	CAP E 10UF/50V	
C953	ECKR1H103ZF5	CAP C .01UF-Z-50V	
C958	ECA2CM470E	CAP E 47UF-160V	
C959	ECKW2H103ZF7	CAP C .01UF-Z-500V	
C960	ECCR2H151J5	CAP C 150-500V	
C961	ECA2AM100B	CAP E 10UF-100V	
C962	ECKW2H103ZF7	CAP C .01UF-Z-500V	
C963	ECCR1H151J5	CAP DISC 150-5-50V	
C964	ECA1CHG101B	CAP E 100UF-16V	
C966	ECA1CHG101B	CAP E 100UF-16V	
C967	ECA1CM221B	CAP E 10UF-16V	
C968	ECKR1H103ZF5	CAP C .01UF-Z-50V	
C969	ECKR1H103ZF5	CAP C .01UF-Z-50V	
C971	TACCW222T50V	CAP C 2200PF/50V	
C1806	ECA1HM4R7B	CAP E 4.7UF-50V CT-27SL33G CT-27SL33UG	
C1807	ECA1CM470B	CAP E 47UF/16V CT-27SL33G CT-27SL33UG	
C1808	TCJ2VF1H103Z	CAP C .01UF-Z-50V CT-27SL33G CT-27SL33UG	
C1811	ECA1HM2R2B	CAP E 2.2UF-50V CT-27SL33G CT-27SL33UG	
C1812	TCJ2VF1H103Z	CAP C .01UF-Z-50V CT-27SL33G CT-27SL33UG	
C1813	ECA1EM470B	CAP E 47UF-25V CT-27SL33G CT-27SL33UG	
C1814	ECA1EM470B	CAP E 47UF-25V CT-27SL33G CT-27SL33UG	
C1815	TCJ2VF1H103Z	CAP C .01UF-Z-50V CT-27SL33G CT-27SL33UG	
C1816	ECA1EM470B	CAP E 47UF-25V CT-27SL33G CT-27SL33UG	
C1817	TCJ2VF1H103Z	CAP C .01UF-Z-50V CT-27SL33G CT-27SL33UG	
C1818	ECA1HM100B	CAP E 10UF/50V CT-27SL33G CT-27SL33UG	
C1819	ECA1EM470B	CAP E 47UF-25V CT-27SL33G CT-27SL33UG	
C1820	TCJ2VF1H103Z	CAP C .01UF-Z-50V CT-27SL33G CT-27SL33UG	
C1821	ECJ2VF1C104Z	CAP C .1UF-Z-16V CT-27SL33G CT-27SL33UG	
C1822	ECJ2VF1C104Z	CAP C .1UF-Z-16V CT-27SL33G CT-27SL33UG	
C1823	TCJ2VF1H103Z	CAP C .01UF-Z-50V CT-27SL33G CT-27SL33UG	
C1824	ECJ2VF1C104Z	CAP C .1UF-Z-16V CT-27SL33G CT-27SL33UG	
C1825	TCJ2VF1H103Z	CAP C .01UF-Z-50V CT-27SL33G CT-27SL33UG	
C1826	TCJ2VF1H103Z	CAP C .01UF-Z-50V CT-27SL33G CT-27SL33UG	
C1827	ECJ2VF1C104Z	CAP C .1UF-Z-16V CT-27SL33G CT-27SL33UG	
C1828	TCJ2VF1H103Z	CAP C .01UF-Z-50V CT-27SL33G CT-27SL33UG	
C1829	ECA1EM470B	CAP E 47UF-25V CT-27SL33G CT-27SL33UG	
C1830	TCJ2VB1H333K	CAP C .033UF-K-50V CT-27SL33G CT-27SL33UG	
C1831	ECA1HMR47B	CAP E .47UF-50V CT-27SL33G CT-27SL33UG	
C1832	ECA1HMR22B	CAP E .22UF-50V CT-27SL33G CT-27SL33UG	
C1834	TCJ2VC1H150J	CAP C 15PF-J-50V CT-27SL33G CT-27SL33UG	
C1835	TCJ2VF1H103Z	CAP C .01UF-Z-50V CT-27SL33G CT-27SL33UG	
C1836	ECA1EM470B	CAP E 47UF-25V CT-27SL33G CT-27SL33UG	
C1838	TCJ2VF1H103Z	CAP C .01UF-Z-50V CT-27SL33G CT-27SL33UG	
C1841	ECA1HM4R7B	CAP E 4.7UF-50V CT-27SL33G CT-27SL33UG	
C1843	ECA1EM470B	CAP E 47UF-25V CT-27SL33G CT-27SL33UG	
C1844	TCJ2VF1H103Z	CAP C .01UF-Z-50V CT-27SL33G CT-27SL33UG	
C1845	ECA1HM100B	CAP E 10UF/50V CT-27SL33G CT-27SL33UG	
C1846	ECA1HM100B	CAP E 10UF/50V CT-27SL33G CT-27SL33UG	
C1847	ECA1HM100B	CAP E 10UF/50V CT-27SL33G CT-27SL33UG	
C1848	ECA1HM100B	CAP E 10UF/50V CT-27SL33G CT-27SL33UG	
C1849	ECA1EM470B	CAP E 47UF-25V CT-27SL33G CT-27SL33UG	

Ref. No.	Part No.	Part Name & Description	Remarks
C1850	TCJ2VF1H103Z	CAP C .01UF-Z-50V CT-27SL33G CT-27SL33UG	
C1851	ECA1HM100B	CAP E 10UF/50V CT-27SL33G CT-27SL33UG	
C1852	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V CT-27SL33G CT-27SL33UG	
C1853	ECJ2VB1C104K	CAP C .1UF-K-16V CT-27SL33G CT-27SL33UG	
C1854	ECA1CM470B	CAP E 47UF/16V CT-27SL33G CT-27SL33UG	
C1855	TCJ2VF1H103Z	CAP C .01UF-Z-50V CT-27SL33G CT-27SL33UG	
C2201	ECA1HM4R7B	CAP E 4.7UF-50V	
C2202	ECA1HM2R2B	CAP E 2.2UF-50V	
C2203	ECA1HM4R7B	CAP E 4.7UF-50V	
C2204	AP106K016CAE	CAP T 10UF/16V	
C2205	ECA1HMR33B	CAP E .33UF-50V	
C2206	ECQB1H223JF3	CAP P .022UF-J-50V	
C2207	AP335K016CAE	CAP T 3.3UF/16V	
C2208	ECJ2VB1C104K	CAP C .1UF-K-16V	
C2209	ECJ2VB1C104K	CAP C .1UF-K-16V	
C2210	ECJ2VB1C104K	CAP C .1UF-K-16V	
C2212	ECQB1H473JF3	CAP P .047UF-J-50V	
C2213	ECA1HMR47B	CAP E .47UF-50V	
C2214	ECA1AM101B	CAP E 100UF-10V	
C2215	EEANA1E100B	CAP E 10UF-25V	
C2216	TCJ2VC1H100D	CAP C 10PF-J-50V	
C2217	ECJ2VB1H102K	CAP C .001UF-K-50V	
C2218	ECJ2VB1H102K	CAP C .001UF-K-50V	
C2219	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C2220	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C2301	ECA1EM102E	CAP E 1000UF-25V	
C2302	ECA1HM010B	CAP E 1UF-50V	
C2304	ECA1CM101B	CAP E 100UF/16V	
C2307	ECA1CM102B	CAP E 1000UF/16V	
C2309	ECA1HM010B	CAP E 1UF-50V	
C2312	ECA1EM220B	CAP E 22UF-25V	
C2317	ECA1CM102B	CAP E 1000UF/16V	
C2319	ECA1HM010B	CAP E 1UF-50V	
C2350	ECA1CM101B	CAP E 100UF/16V	
C2501	TCJ2VB1H332K	CAP C .0033UF-K-50V	
C2502	TCJ2VB1H332K	CAP C .0033UF-K-50V	
C2503	TCJ2VB1H333K	CAP C .033UF-K-50V	
C2504	TCJ2VB1H333K	CAP C .033UF-K-50V	
C2505	EEANA1E4R7B	CAP E 4.7UF-25V	
C2506	EEANA1E4R7B	CAP E 4.7UF-25V	
C2507	TCJ2VB1H472K	CAP C 4700PF-K-50V	
C2508	TCJ2VB1H472K	CAP C 4700PF-K-50V	
C2509	ECJ2VB1C104K	CAP C .1UF-K-16V	
C2510	ECJ2VB1C104K	CAP C .1UF-K-16V	
C2511	ECA1HM010B	CAP E 1UF-50V	
C2512	ECJ2VB1C104K	CAP C .1UF-K-16V	
C2513	ECA1HM4R7B	CAP E 4.7UF-50V	
C2514	ECA1HM4R7B	CAP E 4.7UF-50V	
C2515	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C2516	ECA1HM4R7B	CAP E 4.7UF-50V	
C2517	ECA1HM4R7B	CAP E 4.7UF-50V	
C2518	ECA1HM4R7B	CAP E 4.7UF-50V	
C2519	ECA1CM220B	CAP E 22UF-16V	
C2520	TCJ2VF1H103Z	CAP C .01UF-Z-50V	

Ref. No.	Part No.	Part Name & Description	Remarks
C2531	ECA1HM4R7B	CAP E 4.7UF-50V	
C2532	ECA1HM4R7B	CAP E 4.7UF-50V	
C3001	ECA1CM220B	CAP E 22UF-16V	
C3002	ECA1CM220B	CAP E 22UF-16V	
C3011	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C3012	ECA1HM010B	CAP E 1UF-50V	
C3013	ECA1CM100B	CAP E 10UF-16V	
C3014	ECA1CM100B	CAP E 10UF-16V	
C3015	ECA1HM010B	CAP E 1UF-50V	
C3016	ECA1HM010B	CAP E 1UF-50V	
C3017	ECA1HM010B	CAP E 1UF-50V	
C3018	ECA1HM010B	CAP E 1UF-50V	
C3019	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C3020	ECA1HM010B	CAP E 1UF-50V	
C3025	ECA1HM100B	CAP E 10UF/50V	
C3121	ECA1CM470B	CAP E 47UF/16V	
C3122	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C3234	ECA1CM470B	CAP E 47UF/16V	
C3240	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C4322	ECA1CM100B	CAP E 10UF-16V	
C4323	ECA1CM470B	CAP E 47UF/16V	
C4324	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C4325	ECA1CM100B	CAP E 10UF-B-16V	
C4801	TCJ2VC1H101J	CAP C 100PF-J-50V	
C4802	ECA1HM220B	CAP E 22UF-50V	
C4803	ECQV1H334JL3	CAP P .33UF-J-50V	
C4804	ECKW1H103KB5	CAP C .01UF-K-50V	
C4805	ECA1VM470B	CAP E 47UF/35V	
		DIODES	
D001	MAZ30680ML	DIODE ZENER	
D002	MA2C165001VT	DIODE	
D003	MAZ30510HL	DIODE	
D006	MAZ33000HL	DIODE	
D007	MAZ30510HL	DIODE	
D010	MAZ40510MF	DIODE ZENER	
D055	MAZ40330MF	DIODE ZENER	
D360	B0HAGP000003	DIODE	
D360	MA2C165001VT	DIODE	
D361	B0HAGP000003	DIODE	
D362	B0HAGP000003	DIODE	
D376	AG01V0	DIODE	
D380	MA2C029WBF	DIODE	
D451	B0EAKL000008	DIODE RECTIFIER	
D452	MA2C165001VT	DIODE	
D505	D1NL40V70	DIODE	
D531	MA2C165001VT	DIODE	⚠
D551	B0HAMM000072	DIODE FAST RECOVERY	⚠
D554	AU02V0	DIODE	⚠
D556	MA2C165001VT	DIODE	
D557	MA4027LTA	DIODE	
D558	B0HANV000008	DIODE	
D559	EU2	DIODE	
D561	AU02V0	DIODE	⚠

Ref. No.	Part No.	Part Name & Description	Remarks
D606	MA2C165001VT	DIODE	
D753	AU01ZV0	DIODE	
D801	D3SBA60-4103	DIODE	⚠
D803	MAZ41200MF	DIODE ZENER	
D806	TAP2AA0003	PTC 3-OHM	
D808	SARS01V1	DIODE	
D809	B0HAJP000015	DIODE	
D810	B0HAJP000015	DIODE	
D811	B0HAJP000015	DIODE	
D820	MA2C165001VT	DIODE	
D821	MAZ40470HF	DIODE ZENER	
D822	B0HAMM000103	DIODE	
D823	S3L60P154004	DIODE	⚠
D824	B0HAMM000072	DIODE FAST RECOVERY	
D1802	MA2C165001VT	DIODE CT-27SL33G CT-27SL33UG	
D2302	MAZ43000MF	DIODE ZENER	
D2305	CVS20A120MTA	DIODE	
D2307	CVS20A120MTA	DIODE	
D2350	MAZ40680MF	DIODE ZENER	
D2353	MA2C165001VT	DIODE	
D2355	MAZ30510HL	DIODE	
D2360	CVS20A120MTA	DIODE	
D2361	CVS20A120MTA	DIODE	
D2501	MAZ31100ML	DIODE ZENER	
D3001	MAZ40510MF	DIODE ZENER	
D3004	CVS20A120MTA	DIODE	
D3005	CVS20A120MTA	DIODE	
D3007	MAZ31100ML	DIODE ZENER	
D3008	MAZ31100ML	DIODE ZENER	
D3009	MAZ31100ML	DIODE ZENER	
D3010	MAZ31100ML	DIODE ZENER	
D3011	MAZ31100ML	DIODE ZENER	
D3012	MAZ31100ML	DIODE ZENER	
D3017	MAZ31100ML	DIODE ZENER	
D3018	MAZ31100ML	DIODE ZENER	
D3019	CVS20A120MTA	DIODE	
D3021	CVS20A120MTA	DIODE	
D3023	MAZ31100ML	DIODE ZENER	
D3024	MAZ31100ML	DIODE ZENER	
D4801	MAZ41500MF	DIODE ZENER	
D4802	MAZ41500MF	DIODE ZENER	
D4803	MA2C165001VT	DIODE	
D4804	MA2C165001VT	DIODE	
		FUSES	
F801	XBA2A00101	FUSE 6.3A 125V	⚠
		INTEGRATED CIRCUITS	
IC001	MN101E03GTB3	INT CKT	
IC002	TVR2AJ168S	EEPROM MEMORY	
IC003	GP1UE282GK	INT CKT	
IC004	PST9128NR	INT CKT	
IC005	PQ3RD13	INT CKT	
IC351	C1AA00000622	INT CKT	
IC451	AN5522	INT CKT	

Ref. No.	Part No.	Part Name & Description	Remarks
IC501	NC7SZU04M5X	INT CKT	
IC551	AN78M09LB	INT CKT	
IC552	AN78M05LB	PLUS 5V AVR	
IC801	STRW5634	INT CKT	⚠
IC802	0N3171RLF	INT CKT	⚠
IC1801	M65665CFP	INT CKT CT-27SL33G CT-27SL33UG	
IC1802	PQ1X331M2ZP	INT CKT CT-27SL33G CT-27SL33UG	
IC1803	MM1501XNRE	INT CKT CT-27SL33G CT-27SL33UG	
IC1804	MM1113XFBE	INT CKT CT-27SL33G CT-27SL33UG	
IC2201	AN5829S-E1V	INT CKT	
IC2301	AN17807A	INT CKT	
IC2501	NJW1137MTE1	INT CKT	
IC3001	MM1114XFBE	INT CKT	
IC3002	MM1501XNRE	INT CKT	
IC3101	74HC4066D653	INT CKT	
IC4801	C0AABB000107	INT. CKT.	
		COILS	
L002	EXCELSA39V	FERRITE BEAD	
L003	EXCELDR35V	FERRITE BEAD	
L005	EXCELSA35V	FERRITE BEAD	
L006	EXCELSA35T	FERRITE BEAD	
L007	ELESN330JA	COIL PEAKING 33UH	
L008	G0C470KA0029	COIL PEAKING 47UH	
L010	G0C2R2KA0029	COIL PEAKING 2.2UH	
L011	EXCELSA26T	FERRITE BEAD	
L012	G0C2R2KA0029	COIL PEAKING 2.2UH	
L014	ELESN180KA	COIL PEAKING 18UH	
L015	ELESN3R3JA	COIL PEAKING 3.3UH	
L020	EXCELSA26T	FERRITE BEAD	
L023	EXCELSA26T	FERRITE BEAD	
L032	EXCELSA26T	FERRITE BEAD	
L108	EXCELSA35V	FERRITE BEAD	
L148	EXCELSA35T	FERRITE BEAD	
L245	EXCELSA35V	FERRITE BEAD	
L312	EXCELSA24T	FERRITE BEAD	
L551	ELH5L7115	COIL HORIZONTAL LINEARIT	⚠
L552	EXCELSA39V	FERRITE BEAD	
L751	ELC18B301L	COIL CHOKE	⚠
L752	TALL13N103JB	COIL	
L753	EXCELSA35T	FERRITE BEAD	
L801	ELF20N020A	COIL 2UH	⚠
L802	TALL08T470KA	COIL	
L803	TALL08T680KA	COIL	
L804	EXCELDR35V	FERRITE BEAD	
L805	EXCELDR35V	FERRITE BEAD	
L806	EXCELDR35V	FERRITE BEAD	
L807	EXCELSA35V	FERRITE BEAD	
L808	EXCELSA35V	FERRITE BEAD	
L951	EXCELSA24T	FERRITE BEAD	
L953	EXCELSA24T	FERRITE BEAD	
L954	EXCELSA24T	FERRITE BEAD	
L955	EXCELSA24T	FERRITE BEAD	
L1804	ELESN3R3JA	COIL PEAKING 3.3UH CT-27SL33G CT-27SL33UG	

Ref. No.	Part No.	Part Name & Description	Remarks
L1807	ELESN330JA	COIL PEAKING 33UH CT-27SL33G CT-27SL33UG	
L1808	EXCELDR35V	FERRITE BEAD CT-27SL33G CT-27SL33UG	
L1810	ELESN330JA	COIL PEAKING 33UH CT-27SL33G CT-27SL33UG	
L2301	EXCELSA35T	FERRITE BEAD	
L2303	EXCELSA39V	FERRITE BEAD	
L2305	EXCELSA35V	FERRITE BEAD	
		TRANSISTORS	
Q001	2PD601AR-115	TRANSISTOR	
Q070	2PD601AR-115	TRANSISTOR	
Q092	2PB709AR-115	TRANSISTOR	
Q354	2PD601AR-115	TRANSISTOR	
Q355	2PD601AR-115	TRANSISTOR	
Q356	2PD601AR-115	TRANSISTOR	
Q357	2PD601AR-115	TRANSISTOR	
Q358	2PD601AR-115	TRANSISTOR	
Q359	2PD601AR-115	TRANSISTOR	
Q360	2PB709AR-115	TRANSISTOR	
Q361	2PB709AR-115	TRANSISTOR	
Q362	2PB709AR-115	TRANSISTOR	
Q411	2SB0710AQL	TRANSISTOR	
Q412	2SD0602AQL	TRANSISTOR	
Q451	2PB709AR-115	TRANSISTOR	
Q501	2SC4212HLB	TRANSISTOR	
Q551	2SC5902000LK	TRANSISTOR	⚠
Q560	2PB709AR-115	TRANSISTOR	
Q605	2PB709AR-115	TRANSISTOR	
Q606	2PD601AR-115	TRANSISTOR	
Q751	B1DACM000001	TRANSISTOR	
Q757	2SC1685QRSTA	TRANSISTOR	
Q801	2SD601ARTX	TRANSISTOR	
Q802	2SD601ARTX	TRANSISTOR	
Q820	2SA1767QTA	TRANSISTOR	
Q830	2SB1011QRL	TRANSISTOR	
Q831	2SC1473ATA	TRANSISTOR	
Q901	2SD601ARTX	TRANSISTOR	
Q902	2SB709ARTX	TRANSISTOR	
Q951	2SC3311ATA	TRANSISTOR	
Q952	2SC3311ATA	TRANSISTOR	
Q953	2SC1741ASTP	TRANSISTOR	
Q954	2SB1030ATA	TRANSISTOR	
Q955	2SB1569AF51E	TRANSISTOR	
Q956	2SD2400AF51E	TRANSISTOR	
Q957	2SA1309ATA	TRANSISTOR	
Q958	2SC3311ATA	TRANSISTOR	
Q961	2SC3311ATA	TRANSISTOR	
Q962	2SC3311ATA	TRANSISTOR	
Q1801	2SB709ARTX	TRANSISTOR CT-27SL33G CT-27SL33UG	
Q1802	2SD601ARTX	TRANSISTOR CT-27SL33G CT-27SL33UG	
Q1803	2SD601ARTX	TRANSISTOR CT-27SL33G CT-27SL33UG	
Q1805	2SD601ARTX	TRANSISTOR CT-27SL33G CT-27SL33UG	
Q1806	2SB709ARTX	TRANSISTOR CT-27SL33G CT-27SL33UG	
Q1808	2SB709ARTX	TRANSISTOR CT-27SL33G CT-27SL33UG	
Q1809	2SB709ARTX	TRANSISTOR CT-27SL33G CT-27SL33UG	
Q1810	2SD601ARTX	TRANSISTOR CT-27SL33G CT-27SL33UG	

Ref. No.	Part No.	Part Name & Description	Remarks
Q2350	2PB709AR-115	TRANSISTOR	
Q2361	2PD601AR-115	TRANSISTOR	
Q2362	2PD601AR-115	TRANSISTOR	
Q2363	2PB709AR-115	TRANSISTOR	
Q3001	2PD601AR-115	TRANSISTOR	
Q3002	2PD601AR-115	TRANSISTOR	
Q3193	2PD601AR-115	TRANSISTOR	
Q3194	2PD601AR-115	TRANSISTOR	
Q4801	2PD601AR-115	TRANSISTOR	
		RELAYS	
RL801	K6B1AGA00042	RELAY	⚠
		RESISTORS	
R001	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R004	ERJ6GEYJ562V	RES M 5.6K-J-1/10W	
R005	ERJ6GEYJ471V	RES M 470-J-1/10W	
R007	ERJ6GEYJ471V	RES M 470-J-1/10W	
R008	ERJ6GEYJ223V	RES M 22K-J-1/10W	
R009	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R014	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R015	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R016	ERJ6GEYJ221V	RES M 220-J-1/10W	
R017	ERJ6GEYJ221V	RES M 220-J-1/10W	
R018	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R019	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R020	ERJ6GEYJ221V	RES M 220-J-1/10W	
R021	ERJ6GEYJ101V	RES M 100-J-1/10W	
R022	ERJ6GEYJ101V	RES M 100-J-1/10W	
R023	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R024	ERJ6GEYJ101V	RES M 100-J-1/10W	
R025	ERJ6GEYJ101V	RES M 100-J-1/10W	
R026	ERDS1FJ561P	RES C 560-J-1/2W	
R027	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R032	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R033	ERJ6GEYJ222V	RES M 2.2K-J-1/10W	
R034	ERJ6GEYJ222V	RES M 2.2K-J-1/10W	
R035	ERJ6GEYJ332V	RES M 3.3K-J-1/10W	
R036	ERJ6GEYJ512V	RES M 5.1K-J-1/10W	
R037	ERJ6GEYJ912V	RES M 9.1K-J-1/10W	
R038	ERJ6GEYJ223V	RES M 22K-J-1/10W	
R039	ERDS2TJ102T	RES C 1K-J-1/4W	
R040	ERJ6GEYJ680V	RES M 68-J-1/10W	
R041	ERJ6GEYJ222V	RES M 2.2K-J-1/10W	
R042	ERJ6GEYJ222V	RES M 2.2K-J-1/10W	
R043	ERJ6GEYJ153V	RES M 15K-J-1/10W	
R044	ERJ6GEYJ101V	RES M 100-J-1/10W	
R045	ERDS2TJ101T	RES C 100-J-1/4W	
R046	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R047	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R048	ERJ6GEYJ101V	RES M 100-J-1/10W	
R050	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R052	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R053	ERJ6GEYJ101V	RES M 100-J-1/10W	
R055	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R056	ERJ6GEYJ471V	RES M 470-J-1/10W	

Ref. No.	Part No.	Part Name & Description	Remarks
R057	ERJ6GEYJ101V	RES M 100-J-1/10W	
R059	ERJ6GEYJ121V	RES M 120-J-1/10W	
R060	ERJ6GEYJ101V	RES M 100-J-1/10W	
R061	ERJ6GEYJ221V	RES M 220-J-1/10W	
R062	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R063	ERDS2TJ101T	RES C 100-J-1/4W	
R064	ERJ6GEYJ473V	RES M 47K-J-1/10W	
R065	ERDS2TJ101T	RES C 100-J-1/4W	
R066	ERJ6GEYJ223V	RES M 22K-J-1/10W	
R067	ERJ6GEYJ223V	RES M 22K-J-1/10W	
R068	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R069	ERJ6GEYJ123V	RES M 12K-J-1/10W	
R070	ERJ6GEYJ561V	RES M 560-J-1/10W	
R071	ERJ6GEYJ680V	RES M 68-J-1/10W	
R072	ERJ6GEYJ222V	RES M 2.2K-J-1/10W	
R073	ERJ6GEYJ471V	RES M 470-J-1/10W	
R074	ERJ6GEYJ471V	RES M 470-J-1/10W	
R075	ERJ6ENF3902V	RES M 39K-F-1/10W	
R076	ERJ6ENF6201V	RES M 6.2K-F-1/10W	
R077	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R078	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R084	ERDS2TJ182T	RES C 1.8K-J-1/4W	
R087	ERDS2TJ221T	RES C 220-J-1/4W	
R088	ERJ6GEYJ223V	RES M 22K-J-1/10W	
R092	ERJ6GEYJ473V	RES M 47K-J-1/10W	
R093	ERJ6GEYJ331V	RES M 330-J-1/10W	
R202	ERJ6GEYJ222V	RES M 2.2K-J-1/10W	
R351	ER0S2THF1201	RES M 1.2K-F-1/4W	
R352	ER0S2THF1201	RES M 1.2K-F-1/4W	
R353	ER0S2THF1201	RES M 1.2K-F-1/4W	
R354	ERDS2TJ102T	RES C 1K-J-1/4W	
R355	ERDS2TJ102T	RES C 1K-J-1/4W	
R356	ERDS2TJ102T	RES C 1K-J-1/4W	
R357	ERDS2TJ102T	RES C 1K-J-1/4W	
R358	ERDS1TJ104T	RES C 100K-J-1/2W	
R359	ERDS1TJ104T	RES C 100K-J-1/2W	
R360	ERDS1TJ104T	RES C 100K-J-1/2W	
R361	ER0S2THF5601	RES M 5.6K-F-1/4W	
R362	ER0S2THF2001	RES M 2K-F-1/4W	
R363	ERC12GK102D	RES C 1K-K-1/2W	
R364	ERC12GK102D	RES C 1K-K-1/2W	
R365	ERC12GK102D	RES C 1K-K-1/2W	
R371	ERDS2TJ102T	RES C 1K-J-1/4W	
R371	ERJ6GEYJ101V	RES M 100-J-1/10W	
R372	ERDS2TJ102T	RES C 1K-J-1/4W	
R372	ERJ6GEYJ101V	RES M 100-J-1/10W	
R373	ERJ6GEYJ101V	RES M 100-J-1/10W	
R374	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R374	ERQ12AJ121P	RES F 120-J-1/2W	
R375	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R376	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R377	ERJ6ENF3300V	RES M 330-F-1/10W	
R378	ERJ6ENF3300V	RES M 330-F-1/10W	
R379	ERJ6ENF3300V	RES M 330-F-1/10W	

Ref. No.	Part No.	Part Name & Description	Remarks
R380	ERJ6ENF1501V	RES M 1.5K-F-1/10W	
R381	ERJ6ENF1501V	RES M 1.5K-F-1/10W	
R382	ERJ6ENF1501V	RES M 1.5K-F-1/10W	
R383	ERJ6ENF3481V	RES M 3.48K-F-1/10W	
R384	ERJ6ENF7500V	RES M 750-F-1/10W	
R385	ERDS1FJ150P	RES M 15-J-1/2W	
R389	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R390	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R391	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R411	ERJ6GEYJ682V	RES M 6.8K-J-1/10W	
R412	ERJ6GEYJ471V	RES M 470-J-1/10W	
R413	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R414	ERJ6GEYJ471V	RES M 470-J-1/10W	
R451	ERDS1FJ1R0P	RES C 1.0-J-1/2W	
R452	ERDS1FJ1R0P	RES C 1.0-J-1/2W	
R453	ERJ6GEYJ333V	RES M 33K-J-1/10W	
R454	ERJ6GEYJ363V	RES M 36K-J-1/10W	
R455	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R456	ERG3FJ151	RES M 150-J-3W	
R457	ERDS1FJ1R0P	RES C 1.0-J-1/2W	
R458	ERJ6GEYJ123V	RES M 12K-J-1/10W	
R459	ERJ6GEYJ152V	RES M 1.5K-J-1/10W	
R462	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R463	ERJ6GEYJ473V	RES M 47K-J-1/10W	
R464	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R468	ERJ6ENF1962V	RES M 19.6K-F-1/10W	
R469	ERJ6ENF5621V	RES M 5.62K-F-1/10W	
R471	ERJ6GEYJ223V	RES M 22K-J-1/10W	
R504	ERDS2TJ102T	RES C 1K-J-1/4W	
R505	ERJ6GEYJ562V	RES M 5.6K-J-1/10W	
R506	ERG1SJ562P	RES M 5.6K-J-1W	
R507	ER0S2THF1802	RES M 18K-F-1/4W	⚠
R509	ERJ6ENF1002V	RES M 10K-F-1/10W	⚠
R510	ERG3FJ362	RES M 3.6K-F-3W	⚠
R512	ERJ6GEYJ222V	RES M 2.2K-J-1/10W	
R514	ERJ6GEYJ392V	RES M 3.9K-J-1/10W	
R520	ERJ6GEYJ471V	RES M 470-J-1/10W	
R532	ERJ6ENF2202V	RES M 22K-F-1/10W	⚠
R533	ERJ6ENF1003V	RES M 100K-F-1/10W	⚠
R540	ERJ6GEYJ105V	RES M 1M-J-1/10W	
R541	ERDS2TJ274T	RES C 27K-J-1/4W	
R542	ERJ6GEYJ124V	RES M 120K-J-1/10W	
R547	ERQ1CJPR82S	RES F .82-J-1W	⚠
R551	ERX12SJR47P	RES M .47-J-1/2W	⚠
R552	ERDS1FJ1R0T	RES C 1.0-J-1/2W	⚠
R554	ERG1SJ470P	RES M 47-J-1W CT-27SL13G CT-27SL13UG	
R554	ERG2FJ390H	RES M 39-J-2W CT-27SL33G CT-27SL33UG	
R557	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R559	ERG2FJ683H	RES M 12K-J-2W	
R561	ERG2FJ102H	RES M 1K-J-2W	
R562	ERG2FJ270H	RES M 27-J-2W CT-27SL13G CT-27SL13UG	
R562	ERX3FJ4R7H	RES M 4.7-J-3W CT-27SL33G CT-27SL33UG	
R563	ERG3FJ150H	RES M 15-J-3W	

Ref. No.	Part No.	Part Name & Description	Remarks
R564	ERDS2TJ563T	RES C 56K-J-1/4W	
R565	ERDS2TJ683T	RES C 68K-J-1/4W	
R566	ERG3FJ470H	RES M 47-J-3W CT-27SL33G CT-27SL33UG	
R568	ERG3FJ470H	RES M 47-J-3W CT-27SL33G CT-27SL33UG	
R592	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R605	ERDS2TJ103T	RES C 10K-J-1/4W	
R606	ERJ6GEYJ562V	RES M 5.6K-J-1/10W	
R607	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R608	ERJ6GEYJ104V	RES M 100K-J-1/10W	
R713	ERDS2TJ123T	RES C 12K-J-1/4W	
R716	ERDS2TJ101T	RES C 100-J-1/4W	
R756	ERG2FJ820H	RES M 82-J-2W	
R761	ERDS2TJ102T	RES C 1K-J-1/4W	
R762	ERDS2TJ472T	RES C 4.7K-J-1/4	
R802	ERG2FJ104H	RES M 100K-J-2W	
R804	ERG1DJ224P	RES M 220K-J-1W	
R805	ERX2FZJR15H	RES M .18-J-2W	⚠
R806	ERX12SJ1R5P	RES M 1.5-J-1/2W	⚠
R807	ERDS2TJ681T	RES C 680-J-1/4W	
R808	ERX12SJ1R5P	RES M 1.5-J-1/2W	
R809	ERDS2TJ472T	RES C 4.7K-J-1/4	
R810	ERDS2TJ221T	RES C 220-J-1/4W	
R815	ERC12ZGK825D	RES C 8.2MEG-K-1/2W	⚠
R821	ERDS1FJ1R0T	RES C 1.0-J-1/2W	
R822	ERDS1FJ1R0T	RES C 1.0-J-1/2W	
R823	ERDS1FJ272T	RES C 2.7K-J-1/2W	
R824	ERDS2TJ223T	RES C 22K-J-1/4W	
R825	ERDS2TJ272T	RES C 2.7K-J-1/4W	
R827	ERJ6GEYJ153V	RES M 15K-J-1/10W	
R828	ERJ6GEYJ104V	RES M 100K-J-1/10W	
R829	ERJ6GEYJ104V	RES M 100K-J-1/10W	
R830	ERG2FJ273H	RES M 27K-J-2W	
R831	ERDS2TJ682T	RES C 6.8K-J-1/4W	
R832	ERJ6GEYJ122V	RES M 1.2K-J-1/10W	
R833	ERJ6GEYJ473V	RES M 47K-J-1/10W	
R834	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R837	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R838	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R851	ERQ12HJR56P	RES F .56-J-1/2W	⚠
R902	ERJ6GEYJ392V	RES M 3.9K-J-1/10W	
R903	ERJ6GEYJ561V	RES M 560-J-1/10W	
R905	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R906	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R908	ERJ6GEYJ683V	RES M 68K-J-1/10W	
R909	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R951	ERDS2TJ821T	RES C 820-J-1/4W	
R952	ERDS2TJ153T	RES C 15K-J-1/4W	
R953	ERDS2TJ332T	RES C 3.3K-J-1/4W	
R954	ERDS2TJ431T	RES C 430-J-1/4W	
R956	ERDS2TJ121T	RES C 120-J-1/4W	
R958	ERDS2TJ391T	RES C 390-J-1/4W	
R959	ERDS2TJ101T	RES C 100-J-1/4W	
R960	ERQ14AJ100E	RES F 10-J-1/4W	

Ref. No.	Part No.	Part Name & Description	Remarks
R961	ERQ1CJP331S	RES F 330-J-1W	
R962	ERDS2TJ330T	RES C 33-J-1/4W	
R963	ERDS2TJ330T	RES C 33-J-1/4W	
R964	ERDS2TJ471T	RES C 470-J-1/4W	
R965	ERDS2TJ563T	RES C 56K-J-1/4W	
R966	ERDS1FVJ471T	RES C 470-J-1/4W	
R967	ERDS2TJ563T	RES C 56K-J-1/4W	
R968	ERDS2TJ471T	RES C 470-J-1/4W	
R969	ERDS2TJ390T	RES C 39-J-1/2W	
R970	ERDS2TJ2R2T	RES C 2.2-J-1/4W	
R971	ERDS2TJ2R2T	RES C 2.2-J-1/4W	
R972	ERDS2TJ390T	RES C 39-J-1/2W	
R973	ERDS2TJ101T	RES C 100-J-1/4W	
R974	ERDS2TJ333T	RES C 33K-J-1/4W	
R975	ERDS2TJ101T	RES C 100-J-1/4W	
R976	ERDS2TJ101T	RES C 100-J-1/4W	
R977	ERDS2TJ561T	RES C 560-J-1/4W	
R978	ERDS2TJ101T	RES C 100-J-1/4W	
R987	ERDS2TJ472T	RES C 4.7K-J-1/4	
R988	ERDS2TJ331T	RES C 330-J-1/4W	
R989	ERDS2TJ682T	RES C 6.8K-J-1/4W	
R990	ERDS2TJ471T	RES C 470-J-1/4W	
R993	ERDS2TJ471T	RES C 470-J-1/4W	
R1804	ERJ6GEYJ103V	RES M 10K-J-1/10W CT-27SL33G CT-27SL33UG	
R1805	ERJ6GEYJ102V	RES M 1K-J-1/10W CT-27SL33G CT-27SL33UG	
R1806	ERJ6GEYJ392V	RES M 3.9K-J-1/10W CT-27SL33G CT-27SL33UG	
R1807	ERJ6GEYJ102V	RES M 1K-J-1/10W CT-27SL33G CT-27SL33UG	
R1809	ERJ6GEYJ392V	RES M 3.9K-J-1/10W CT-27SL33G CT-27SL33UG	
R1810	ERJ6GEYJ102V	RES M 1K-J-1/10W CT-27SL33G CT-27SL33UG	
R1811	ERJ6GEYJ392V	RES M 3.9K-J-1/10W CT-27SL33G CT-27SL33UG	
R1812	ERJ6GEYJ103V	RES M 10K-J-1/10W CT-27SL33G CT-27SL33UG	
R1814	ERJ6GEYJ335V	RES M 3.3M-J-1/10W CT-27SL33G CT-27SL33UG	
R1815	ERJ6GEYJ121V	RES M 120-J-1/10W CT-27SL33G CT-27SL33UG	
R1816	ERJ6GEYJ222V	RES M 2.2K-J-1/10W CT-27SL33G CT-27SL33UG	
R1817	ERJ6ENF4700V	RES M 470-F-1/10W CT-27SL33G CT-27SL33UG	
R1818	ERJ6ENF1001V	RES M 1K-F-1/10W CT-27SL33G CT-27SL33UG	
R1819	ERJ6ENF4701V	RES M 4.7K-F-1/10W CT-27SL33G CT-27SL33UG	
R1820	ERJ6ENF4701V	RES M 4.7K-F-1/10W CT-27SL33G CT-27SL33UG	
R1821	ERJ6GEYJ102V	RES M 1K-J-1/10W CT-27SL33G CT-27SL33UG	
R1822	ERJ6GEYJ682V	RES M 6.8K-J-1/10W CT-27SL33G CT-27SL33UG	
R1825	ERJ6GEYJ103V	RES M 10K-J-1/10W CT-27SL33G CT-27SL33UG	
R1826	ERJ6GEYJ682V	RES M 6.8K-J-1/10W CT-27SL33G CT-27SL33UG	
R1827	ERJ6GEYJ103V	RES M 10K-J-1/10W CT-27SL33G CT-27SL33UG	
R1828	ERJ6GEYJ121V	RES M 120-J-1/10W CT-27SL33G CT-27SL33UG	
R1829	ERJ6GEYJ471V	RES M 470-J-1/10W CT-27SL33G CT-27SL33UG	
R1830	ERJ6GEYJ121V	RES M 120-J-1/10W CT-27SL33G CT-27SL33UG	
R1831	ERJ6GEYJ471V	RES M 470-J-1/10W CT-27SL33G CT-27SL33UG	
R1832	ERJ6GEYJ471V	RES M 470-J-1/10W CT-27SL33G CT-27SL33UG	
R1834	ERJ6ENF1202V	RES M 12K-F-1/10 CT-27SL33G CT-27SL33UG	
R1835	ERJ6ENF2701V	RES M 2.7K-F-1/10W CT-27SL33G CT-27SL33UG	
R1842	ERJ6GEYJ101V	RES M 100-J-1/10W CT-27SL33G CT-27SL33UG	
R1843	ERJ6GEYJ101V	RES M 100-J-1/10W CT-27SL33G CT-27SL33UG	
R2201	ERJ6GEYJ224V	RES M 220K-J-1/10W	
R2203	ERJ6GEYJ102V	RES M 1K-J-1/10W	

Ref. No.	Part No.	Part Name & Description	Remarks
R2204	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R2205	ERDS2TJ101T	RES C 100-J-1/4W	
R2206	ERDS2TJ273T	RES C 27K-J-1/4W	
R2307	ERDS2TJ222T	RES C 2.2K-J-1/4W	
R2320	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R2351	ERJ6GEYJ751V	RES M 750-J-1/10W	
R2352	ERJ6GEYJ152V	RES M 1.5K-J-1/10W	
R2356	ERJ6GEYJ101V	RES M 100-J-1/10W	
R2357	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R2360	ERJ6GEYJ271V	RES M 270-J-1/10W	
R2361	ERJ6GEYJ221V	RES M 220-J-1/10W	
R2362	ERJ6GEYJ221V	RES M 220-J-1/10W	
R2363	ERJ6GEYJ332V	RES M 3.3K-J-1/10W	
R2364	ERJ6ENF1001V	RES M 1K-F-1/10W	
R2365	ERJ6ENF8200V	RES M 820-F-1/10W	
R2366	ERJ6GEYJ331V	RES M 330-J-1/10W	
R2367	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R2368	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R2369	ERJ6GEYJ271V	RES M 270-J-1/10W	
R2370	ERJ6GEYJ222V	RES M 2.2K-J-1/10W	
R2417	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R2504	ERDS2TJ101T	RES C 100-J-1/2W	
R2505	ERDS2TJ101T	RES C 100-J-1/2W	
R3001	ERDS2TJ101T	RES C 100-J-1/4W	
R3002	ERJ6GEYJ221V	RES M 220-J-1/10W	
R3003	ERJ6GEYJ221V	RES M 220-J-1/10W	
R3004	ERDS2TJ101T	RES C 100-J-1/4W	
R3005	ERJ6GEYJ334V	RES M 330K-J-1/10W	
R3006	ERJ6ENF75R0V	RES M 75.0-F-1/10W	
R3007	ERJ6ENF75R0V	RES M 75.0-F-1/10W	
R3008	ERJ6ENF75R0V	RES M 75.0-F-1/10W	
R3010	ERJ6GEYJ334V	RES M 330K-J-1/10W	
R3013	ERJ6ENF75R0V	RES M 75.0-F-1/10W	
R3014	ERJ6ENF75R0V	RES M 75.0-F-1/10W	
R3015	ERJ6ENF75R0V	RES M 75.0-F-1/10W	
R3016	ERDS2TJ181T	RES C 180-J-1/4W	
R3017	ERDS2TJ181T	RES C 180-J-1/4W	
R3018	ERDS2TJ101T	RES C 100-J-1/4W	
R3021	ERDS2TJ101T	RES C 100-J-1/4W	
R3022	ERDS2TJ101T	RES C 100-J-1/4W	
R3023	ERDS2TJ101T	RES C 100-J-1/4W	
R3024	ERDS2TJ101T	RES C 100-J-1/4W	
R3025	ERDS2TJ101T	RES C 100-J-1/2W	
R3026	ERDS2TJ101T	RES C 100-J-1/4W	
R3027	ERDS2TJ101T	RES C 100-J-1/4W	
R3030	ERJ6GEYJ223V	RES M 22K-J-1/10W	
R3031	ERJ6GEYJ223V	RES M 22K-J-1/10W	
R3032	ERJ6GEYJ223V	RES M 22K-J-1/10W	
R3033	ERJ6GEYJ223V	RES M 22K-J-1/10W	
R3034	ERJ6GEYJ471V	RES M 470-J-1/10W	
R3035	ERJ6GEYJ562V	RES M 5.6K-J-1/10W	
R3036	ERJ6GEYJ183V	RES M 18K-J-1/10W	
R3037	ERJ6GEYJ471V	RES M 470-J-1/10W	
R3038	ERJ6GEYJ562V	RES M 5.6K-J-1/10W	

Ref. No.	Part No.	Part Name & Description	Remarks
R3039	ERJ6GEYJ183V	RES M 18K-J-1/10W	
R3041	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R3042	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R3101	ERJ6GEYJ334V	RES M 330K-J-1/10W	
R3102	ERJ6GEYJ334V	RES M 330K-J-1/10W	
R3103	ERJ6GEYJ334V	RES M 330K-J-1/10W	
R3104	ERJ6GEYJ334V	RES M 330K-J-1/10W	
R3131	ERJ6GEYJ223V	RES M 22K-J-1/10W	
R3132	ERJ6GEYJ223V	RES M 22K-J-1/10W	
R3133	ERJ6GEYJ153V	RES M 15K-J-1/10W	
R3134	ERJ6GEYJ333V	RES M 33K-J-1/10W	
R3135	ERJ6GEYJ154V	RES M 150K-J-1/10W	
R4801	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R4802	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R4803	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R4804	ERJ6GEYJ562V	RES M 5.6K-J-1/10W	
R4805	ERJ6GEYJ562V	RES M 5.6K-J-1/10W	
R4806	ERG1SJ100P	RES M 10-J-1W	
R4807	ERDS2TJ100T	RES C 10-J-1/4W	
R4808	ERJ6GEYJ683V	RES M 68K-J-1/10W	
R4809	ERJ6GEYJ333V	RES M 33K-J-1/10W	
R4811	ERJ6GEYJ473V	RES M 47K-J-1/10W	
R4812	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R4813	ERJ6GEYJ473V	RES M 47K-J-1/10W	
R4815	ERJ6ENF1402V	RES M 14K-F-1/10W	
R4816	ERJ6ENF8201V	RES M 8.2K-F-1/10W	
		SWITCHES	
S001	EVQPF106K	SWITCH	
S002	EVQPF106K	SWITCH	
S003	EVQPF106K	SWITCH	
S004	EVQPF106K	SWITCH	
S005	EVQPF106K	SWITCH	
S008	EVQPF106K	SWITCH	
S009	EVQPF106K	SWITCH	
		TRANSFORMERS	
T501	ETH19Y211AZ	TRANSFORMER	
T551	TLF2AA005	TRANSFORMER FLYBACK (SS)	⚠
T801	ETS35AA6B5NC	TRANSFORMER	⚠
T3001	TF0402B04P03	TRANSFORMER	
T3002	TF0402B04P03	TRANSFORMER	
		CRYSTALS/FILTERS	
X001	A1100005BD	CRYSTAL	
X1801	TSSA092	CRYSTAL OSCILLATOR CT-27SL33G CT-27SL33UG	
		OTHERS	
TNR001	ENGF6102G	TUNER CT-27SL33G CT-27SL33UG	⚠
TNR001	ENG36621G	TUNER CT-27SL13G CT-27SL13UG	⚠
TNR1801	ENG36620G	SUB TUNER CT-27SL33G CT-27SL33UG	⚠
1	A68QCP893XU	CRT 27 INCH	⚠
M001	TJS2AC00401	CRT SOCKET (ON CRT BOARD)	⚠
2	TLY2AA020	DEFLECTION YOKE	⚠
M002	TXF3A011EV	DAG GROUND	
3	TSP2AA026-1	DEGAUSSING COIL	⚠

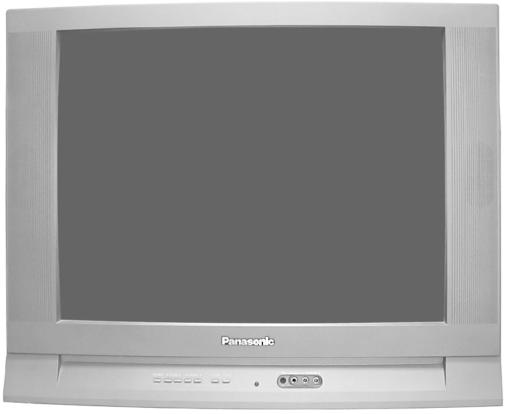
Ref. No.	Part No.	Part Name & Description	Remarks
4	TP-13000PX5	CONVERGENCE YOKE	
5	EASG12D552C2	SPEAKER	
M003	TXFKP13GSER	SPEAKER BRACKET	
6	TBX2AA0211	BUTTON FUNCTION 7-KEY	
7	TKP2AA0832S	FRONT DOOR	
8	TEK6935	DOOR CATCH	
9	TKX2AA0135	IR GUIDE	
M004	0FMK014ZZ	CONVERGENCE CORRECTOR STRIP	
M005	TSN63115-4	PURITY MAGNET	
10	TSP2AF005	GEOMAGNETIC COIL	
M006	TSX2AA0361	AC LINE CORD	⚠
11	TXFKY18GSER	FRONT CABINET	
12	TXFKU14GSER	BACK CABINET	
13	TBM2AA0026	PANASONIC BADGE	
JK3001	TJB2AA0221	TERMINAL A/V 8P	
JK3002	TJB2AA0045	TERMINAL FRONT A/V	
JK3003	TJB2AA0421	TERMINAL SUPER-VIDEO	
JK3004	TJB2AA0211-1	TERMINAL A/V 2P	
ACCESORIES			
M007	EUR7613Z60	REMOTE CONTROL CT-27SL13G CT-27SL13UG	
M008	EUR7613Z70	REMOTE CONTROL CT-27SL33G CT-27SL33UG	
M009	UR76EC0303A	REMOTE CONTROL BATTERY COVER CT-27SL33G CT-27SL33UG	
M010	UR76EC0303D	REMOTE CONTROL BATTERY COVER CT-27SL13G CT-27SL13UG	
M011	TQB2AA0454	OWNERS MANUAL CT-27SL13G CT-27SL13UG	
M012	TQB2AA0456	OWNERS MANUAL CT-27SL33G CT-27SL33UG	

Order No. MTNC030728A1
B05

Service Manual

Color Television

CT-27C8G / CT-27G8G / CT-27G8UG / CT-27L8G / CT-27L8UG / CT-27L8SG
NA10



1. Safety precautions

General guidelines

An isolation transformer should always be used during the servicing of a receiver whose chassis is not isolated from AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injuryfrom electrical shocks. It will also protect the receiver from being damaged by accidental shorting that may occur during servicing.
When servicing, observe the original lead dress, especially in the high voltage circuit. Replace all damaged parts (also parts that show signs of overheating.)
Always replace protective devices, such as fish paper, isolation resistors and capacitors, and shields after servicing the receiver. Use only manufacturer’s recommended rating for fuses, circuits breakers, etc.
High potentials are present when this receiver is operating. Operation of the receiver without the rear cover introduces danger for electrical shock. Servicing should not be performed by anyone who is not thoroughly familiar with the necessary precautionswhen servicing high voltage equipment.
Extreme care should be practiced when handling the picture tube. Rough handling may cause it to implode due to atmospheric pressure. (14.7 lbs per sq. in.). Do not nick or scratch the glass or subject it to any undue pressure. When handling, usesafety goggles and heavy gloves for protection. Discharge the picture tube by shorting the anode to chassis ground (not to the cabinet or to other mounting hardware). When discharging connect cold ground (i.e. dag ground lead) to the anode with a wellinsulated wire or use a grounding probe.Avoid prolonged exposure at close range to unshielded areas of the picture tube to prevent exposure to x ray radiation.
The test picture tube used for servicing the chassis at the bench should incorporate safety glass and magnetic shielding. The safety glass provide shielding for the tube viewing area against x ray radiation as well as implosion. The magnetic shieldlimits the x ray radiation around the bell of the picture tube in addition to the restricting magnetic effects. When using a picture tube test jig for service, ensure that the jig is capable of handling 50kV without causing x ray radiation.
Before returning a serviced receiver to the owner, the service technician must thoroughly test the unit to ensure that is completely safe to operate. Do not use a line isolation transformer when testing.

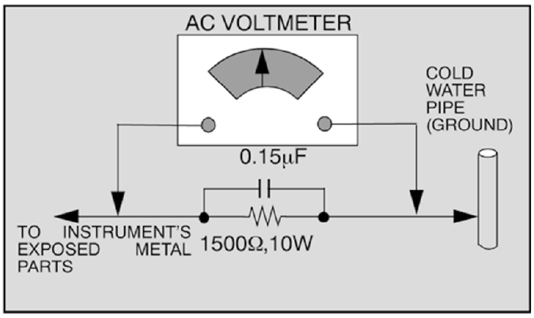
Leakage current cold check

Unplug the A.C. cord and connect a jumper between the two plug prongs.Measure the resistance between the jumpered AC plug and expose metallic parts such as screwheads, antenna terminals, control shafts, etc. If the exposed metallic part has a returnpath to the chassis, the reading should be between 240k Ω and 5.2M Ω . If the exposed metallic part does not have a return path to the chassis, the reading should be infinite.

Leakage current hot check

Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during the check.
Connect a 1.5k Ω 10 watt resistor in parallel with a 0.15 μ F capacitor between an exposed metallic part and ground. Use earth ground, for example a water pipe.
Using a DVM with a 1000 ohms/volt sensitivity or higher, measure the AC potential across the resistor.
Repeat the procedure and measure the voltage present with all other exposed metallic parts.
Verify that any potential does not exceed 0.75 volt RMS. A leakage current tester (such a Simpson model 229, Sencore model PR57 or equivalent) may be used in the above procedure, in which case any current measure must not exceed 0.5 milliamp. Ifany measurement is out of the specified limits, there is a possibility of a shock hazard and the receiver must be repaired and rechecked before it is returned to the customer.

Hot check circuit



Insulation test

Connect an insulation tester between an exposed metallic part and A.C. line. Apply 1080VAC/ 60Hz for 1 second. Confirm that the current measurement is 0.5mA ~ 2.0mA. Repeat test with other metallic exposed parts.

X ray radiation

WARNING
The potential source of x ray radiation in the TV set is in the high voltage section and the picture tube.

NOTE
It is important to use an accurate, calibrated high voltage meter.

Set the brightness, picture, sharpness and color controls to minimum.

Measure the high voltage. The high voltage should be 29.25 ± 1.25kV. If the upper limit is out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature component failure.

Horizontal oscillator disable circuit test

This test must be performed as a final check before the receiver is returned to the customer. See horizontal oscillator disable circuit procedure check in this manual.

2. Service notes

NOTE

These components are affixed with glue. Be careful not to break or damage any foil under the component or at the pins of the ICs when removing. Usually applying heat to the component for a short time while twisting with tweezers will break the component loose.

Leadless chip component (surface mount)

Chip components must be replaced with identical chips due to critical foil track spacing. There are no holes in the board to mount standard transistors or diodes. Some chips capacitor or resistor board solder pads may have holes through the board,however the hole diameter limits standard resistor replacement to 1/8 watt. Standard capacitor may also be limited for the same reason. It is recommended that identical components be used.

Chip resistor have a three digit numerical resistance code, 1st and 2nd significant digits and a multiplier. Example: 162 = 1600 or 1.6k Ω resistor, 0 = 0 Ω (jumper).

Chip capacitors generally do not have the value indicated on the capacitor. The color of the component indicates the general range of the capacitance.

Chip transistors are identified by a two letter code. The first letter indicates the type and the second letter, the grade of transistor.

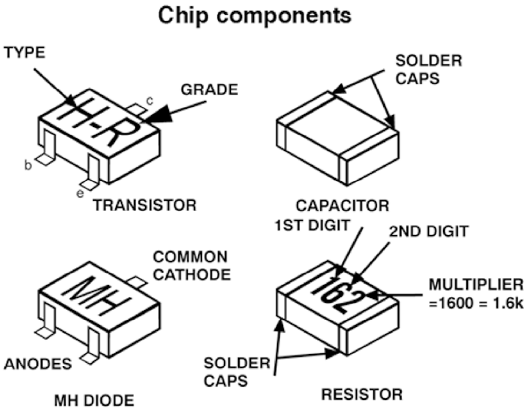
Chip diodes have a two letter identification code as per the code chart and are a dual diode pack with either common anode or common cathode. Check the parts list for correct diode number.

Component removal

1. Use solder wick to remove solder from component end caps or terminal.
2. Without pulling up, carefully twist the component with tweezers to break the adhesive.
3. Do not reuse removed leadless or chip components since they are subject to stress fracture during removal.

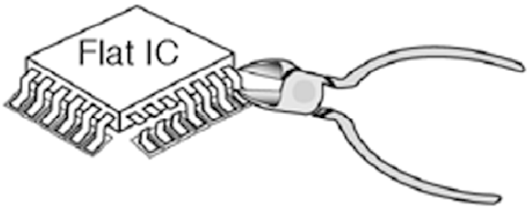
Chip component installation

1. Put a small amount of solder on the board soldering pads.
2. Hold the chip component against the soldering pads with tweezers or with a miniature alligator clip and apply heat to the pad area with a 30 watt iron until solder flows. Do not apply heat for more than 3 seconds.

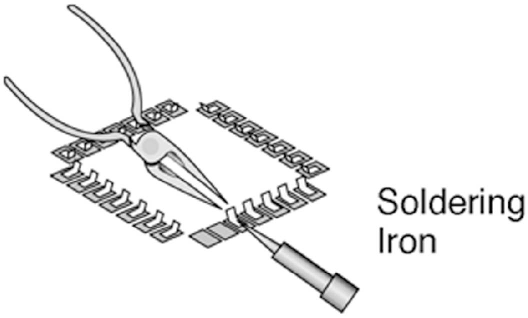


How to replace flat ic (required tools)

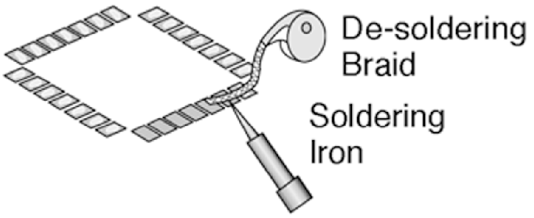
1. Remove the solder from all of the pins of a Flat IC by using a desolder braid



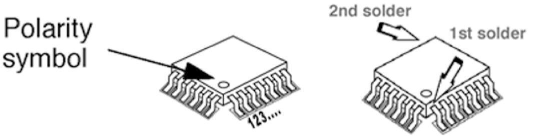
2. Put the iron wire under the pins of the Flat IC and pull it in the direction indicated while heating the pins using a soldering iron. A small awl can be used instead of the iron wire.



3. Remove the solder from all the pads of the Flat IC by using a de solder braid



4. Position the new Flat IC in place (apply the pins of the Flat IC to the soldering pads where the pins need to be soldered). Properly determine the positions of the soldering pads and pins by correctly aligning the polarity symbol



5. Solder all pins to the soldering pads using a fine tipped soldering iron

6. Check with a magnifier for solder bridge between the pins or for dry joint between pins and soldering pads. To remove a solder bridge, use a de solder braid as shown in the figure below

IMPORTANT

To protect against possible damage to the solid state devices due to arching or static discharge, make certain that all ground wires and CRT DAG wire are securely connected.

CAUTION

The power supply circuit is above earth ground and the chassis cannot be polarized. Use an isolation transformer when servicing the receiver to avoid damage to the test equipment or to the

chassis. Connect the test equipment to the proper ground(hot) or (cold) when servicing, or incorrect voltages will be measured.

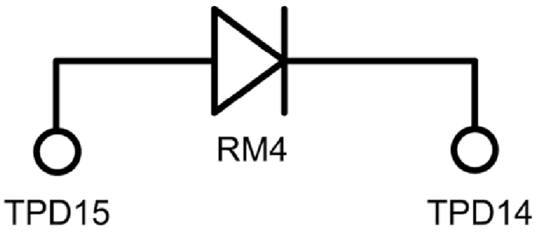
2.1. X-Ray Protection Circuit Check& Adjustments

This test must be performed as final check before the receiver is returned to the customer. If voltages are out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature componentfailure.

Equipment:

1. Isolation transformer.
2. High voltage meter.
3. D.C. Ammeter
4. Short jumper.
5. HHS jig (See figure below).

Diode Connection Jumper.



Preparation:

1. Make sure the receiver is turned off.
2. Connect the receiver to an isolation transformer.
3. Connect the ammeter serial from the flyback anode lead to the picture tube anode socket.
4. Prepare short jumper and HHS jig.

Procedure:

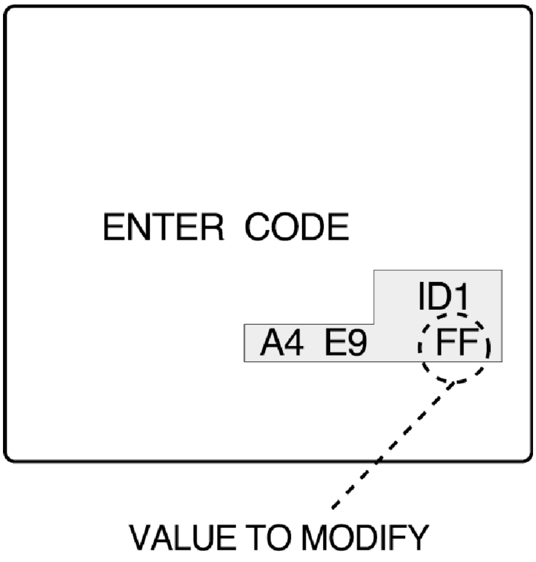
1. Connect the short jumper between TPD16 & TPD17.
2. Connect the jumper diode between TPD14 and TPD15 (anode connected to TPD15 and cathode to TPD14).
3. Apply 75VAC to AC input of isolation transformer.
4. Turn the receiver on.

5. **Apply a monoscope pattern.**
6. **Set customer picture and brightness controls to the minimum.**
7. **Set current within 50 μ A to 100 μ A by changing the picture and bright controls.**
8. **Slowly increase AC voltage at the input of the isolation transformer and confirm HHS voltage measure 33kV.**
9. **Turn power off and remove jigs.**

3. EEPROM replacement

If a new EEPROM integrated circuit is replaced for servicing, follow the next procedure once that the memory is properly assembled:

1. **Enter to service mode.**
2. **Turn the TV set ON.**
3. **Once inside service mode the first image that appears on-screen is the ID1 register with the respective address value (FF) like the image below.**
   Note:
   All 3 registers (ID1,ID2,ID3) should appear with FF values if a new EEPROM is assembled.



4. **With "VOL" keys adjust the correct value according with the service adjustment table (see "Service Mode" section on page 15).**
5. **Change to the next ID switch register with "CH" keys and repeat**

the same procedure as step 4.

6. When replacing a new EEPROM be sure to set the correct ID switch values for each model.

7. Once that all 3 registers are set with the correct address value, perform all of the remaining adjustments and servicing.

IMPORTANT:

Correct ID switch configuration should be input when replacing EEPROM for each television model, otherwise if wrong values are configured, the television software will not function accordingly and properly.

4. About lead free solder (PbF)

NOTE

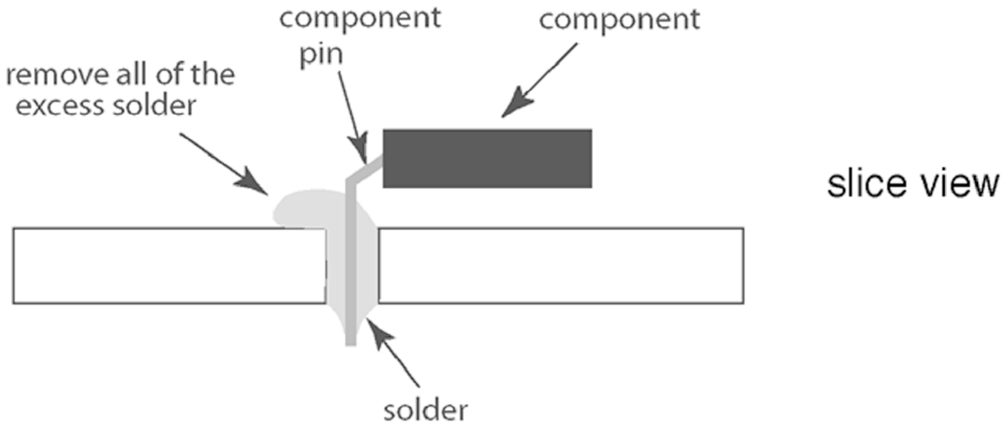
Lead is listed as (Pb) in the periodic table of elements. / In the information below, Pb will refer to lead solder, and PbF will refer to Lead Free Solder. / The lead free solder used in our manufacturing process and discussed below is (Sn+Ag+Cu). / Thatis Tin (Sn), Silver (Ag) and Copper (Cu) although other types are available.

This model uses Pb Free solder in it’s manufacture due to environmental conservation issues. For / service and repair work, we’d suggest the use of Pb free solder as well, although Pb solder may be / used. / PCBs manufacturedusing lead free solder will have the “PbF” or a leaf symbol stamped on the / back of PCB.

CAUTION

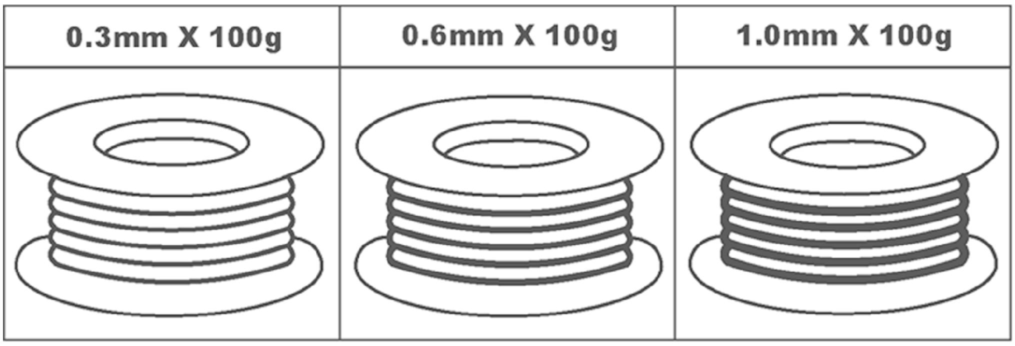
- **Pb free solder has a higher melting point than standard solder. Typically the melting point is 50 ~ 70 °F (30 ~ 40 °C) higher. Please use a high temperature soldering iron and set it to 700 ± 20 °F (370 ± 10 °C).**
- **Pb free solder will tend to splash when heated too high (about 1100 °F or 600 °C). / If you must use Pb solder, please completely remove all of the Pb free solder on the pins or solder area before applying Pb solder. If thisis not practical, be sure to heat the Pb free solder until it melts, before applying Pb solder.**
- **After applying PbF solder to double layered boards, please check the component side for excess solder which may flow onto the**

opposite side.



Suggested Pb free solder

There are several kinds of Pb free solder available for purchase. This product uses Sn+Ag+Cu (tin, silver, copper) solder. However, Sn+Cu (tin, copper), Sn+Zn+Bi (tin, zinc, bismuth) solder can also beused.



5. Receiver feature table

FEATURE/MODEL	CT-27C8G	CT-27L8G/UG/SG	CT-27G8G/
CHASSIS	BP404		AP404
MICRO	128K		
MENU LANGUAGE	ENG/SPAN/FR		
CLOSED CAPTION	X		
V-CHIP (USA/CANADA)	X		
CHANNEL COUNT	181		
REMOTE CONTROL	EUR7613Z10	EUR7713010	
CRT SUPPLIER	MDDA		
CHASSIS	NA10		
COMB FILTER	DIGITAL		
V/A NORM (X=BOTH)	V		
MTS/SAP/DBX	X		
BUILT-IN AUDIO POWER	1.5Wx2 (10%)		
No. OF SPEAKERS	2		
AI SOUND	X		
A/V IN (REAR/FRONT)	2(2/1)		
COMPONENT INPUT (Y, Pb, Pr)	1		---
S-VIDEO INPUT (REAR/FRONT)	1/0		
DIMENSIONS(WxDxH)	754.3x534.3x601.6mm29.[illegible]	[illegible]1.8mm26.[illegible]	[illegible]1.8mm26.
WEIGHT (Kg/Lbs)	35.4/78.04	34.5/76.05	34.5/76.0
VIDEO INPUT JACK	1Vp-p 75 Ω , phono jack		
AUDIO INPUT JACK	500mV RMS 47k Ω		
HEADPHONE JACK	X		

Note:
Specifications are subject to change without notice or obligation. Dimensions and weights are approximate.

6. Board description table

CT-27G8G / CT-27G8UG

BOARD	PART NUMBER	DESCRIPTION
A	TNP2AH047GA	MAIN BOARD
C	TNP2AA122GA	CRT BOARD

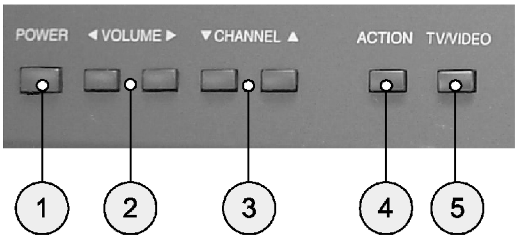
CT-27L8G / CT-27L8UG / CT-27L8SG / CT-27C8G

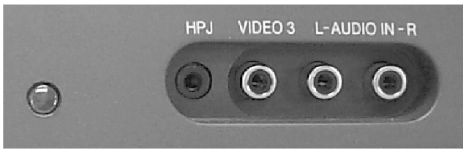
BOARD	PART NUMBER	DESCRIPTION
A	TNP2AH047GB	MAIN BOARD
C	TNP2AA122GA	CRT BOARD

NOTE
When ordering a replacement board assembly, append an “S” to the board number

EXAMPLE
To order the A Board, for CT-27G8G the replacement board is TNP2AH047GAS.

7. TV Location of controls





IR Sensor
& Front A/V jacks

Quick reference control operation	
1	**Power** - Press to turn ON or OFF.
2	**Volume** - Press to adjust sound level, or to adjust audio menus, video menus, and select operating features when menus are displayed
3	**Channel** - Press to select programmed channels. Press to highlight desired features when menus are displayed. Also use to select cable converter box channels after programming remote control infra-red codes (the TV/AUX/CABLE switch must be set in CABLE position).
4	**Action** - Press to display main menu and access on screen feature and adjustment menus.
5	**TV/Video** - Press to select TV or one of the video inputs, for the main picture or the PIP frame (when PIP frame is displayed).

8. Location of controls (remote)

8.1. EUR7713010

POWER
Press to turn ON and OFF.

VOL
Press to adjust TV sound and navigate in menus.

MUTE
Press to mute sound.

KEYBOARD
Press to select any channel.

R-TUNE
Press to switch to previously viewed channel or video mode.

SAP
Press to acces the secondary audio program broadcast.

CH
Press to select next or previous channel and navigate in menus.

TV/VIDEO
Press to select TV, Video mode.

RECALL
Press to display time, channel sleep timer and other options.

Note:
For additional information about this remote please refer to the owner's manual section remote operation, listed on the parts list section.

8.2. EUR7613Z10

POWER
Press to turn ON and OFF.

TV - VCR - DBS/CBL - DVD
Press to select a component.

MUTE
Press to mute sound.

TV/VIDEO
Press to select TV, Video mode.

MENU
Press to select TV, Video mode.

KEYBOARD
Press to select any channel.

R-TUNE
Press to switch to previously viewed channel or video mode.

SAP
Press to acces the secondary audio program broadcast.

CH
Press to select next or previous channel and navigate in menus.

VOL
Press to adjust TV sound and navigate in menus.

RECALL
Press to display time, channel sleep timer and other options.

GUIDE
DBS and DVD functions button.

EXIT
DBS menu function button.

PROG
Press for delimiter between major and minor channel number.

Note:
For additional information about this remote please refer to the owner's manual section remote operation, listed on the parts list section.

9. Dissasembly for service

Back cover
Remove all the screws marked with an arrow (←) from the back of the receiver

NOTE
Screw configuration, type, and number of screws vary depending on the model of the receiver serviced and the application; various models are covered in this manual. Use same hardware when reassembling the receiver.

- 3 screws at the top edge of the receiver.
- 1 screw by the A/V jacks.
- 1 screw at each lower corner of the receiver.
- 1 screw by the Flyback.
- 1 screw by the AC cord (only in CT-27C8G models).

A-Board - Main chassis

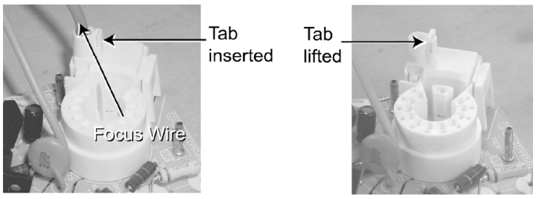
1. **Slide the chassis completely out of the guide rails.**
2. **Stand the receiver on its edge. The underside of the board is completely accessible for component replacement.**

Note:
Some tie-wraps that secure the wire dressings may need to be unfastened for chassis removal.

C-Board - CRT output

The board plugs onto the socket on the CRT neck. To release the Focus wire, use a dull object to release the tab on the socket (near the wire opening) and carefully pull on the wire. To connect the focus wire, press on the tab to lock it then insertthe wire in the opening and press on it until it is fully inserted and locked in place.

Focus cable release



Speakers
Each speaker is secured to the cabinet with 4 screws.

NOTE
When reassembling speakers be sure to connect the speaker wires to the correct speaker lead (+) (-)

9.1. Disassembly for CRT replacement

1. **Discharge the CRT as instructed in the “safety precautions”.**
2. **Disconnect the yoke (DY) plug, degaussing coil (DEG) plug from the main board.**

3. Unplug the CRT 2nd anode button from the main board.
4. Remove the C-Board from the CRT base and unplug the black wires (CRT dag ground) C10 & C11.
5. Disconnect the speakers plug from the A-Board.
6. Lift the main chassis (A-Board) and all mounted boards completely out with the CRT board attached.
7. Perform complete removal of chassis, as instructed in “disassembly for service” section.

CRT replacement

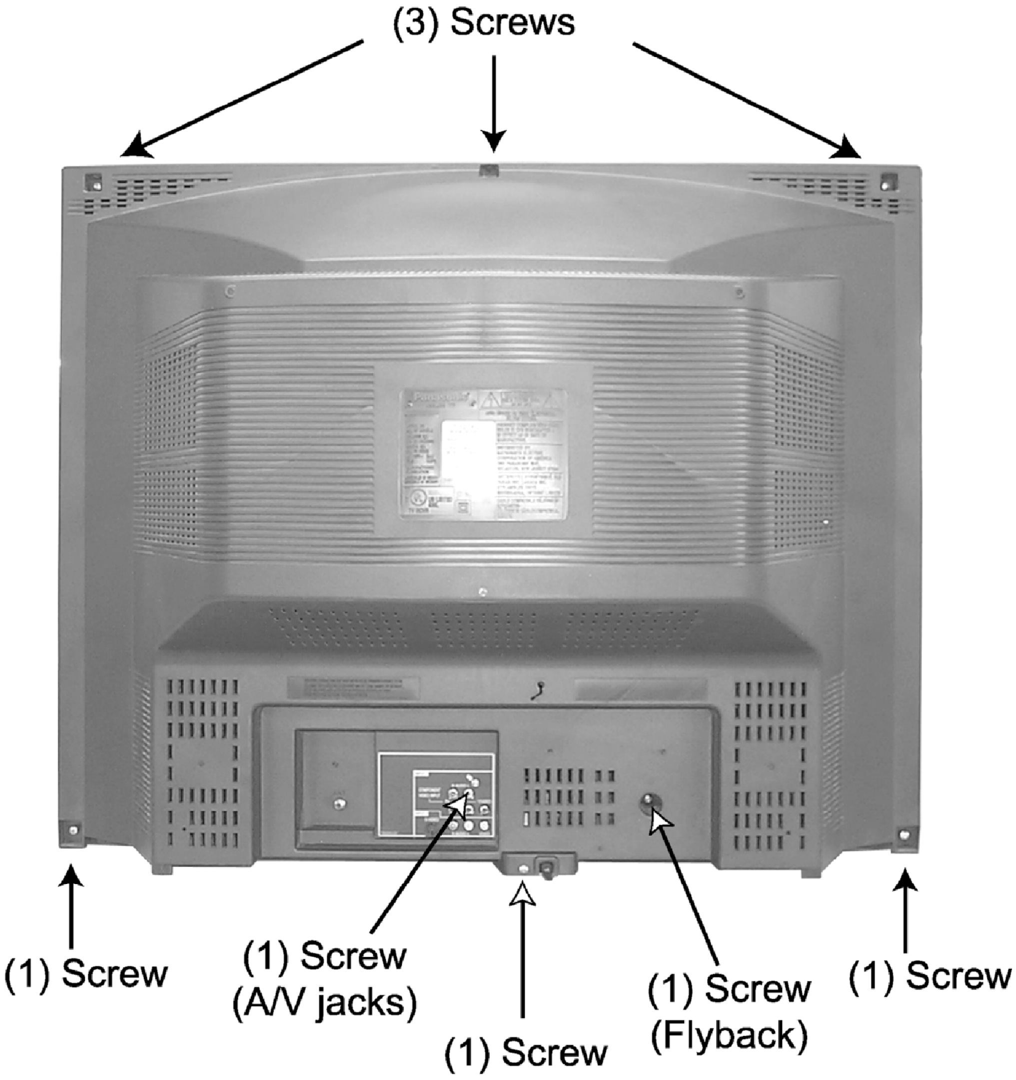
1. Perform “disassembly for CRT replacement” procedure.
2. Insure that the CRT H.V. Anode button is discharged before handling the CRT. Read the “safety precautions” section on handling the picture tube.
3. Remove the components from the CRT neck and place the cabinet face down on a soft pad.
4. Note the original order for the CRT mounting hardware as they are remove from the CRT mounting brackets at each corner of the CRT.
5. Remove the CRT with the degaussing coil and the dag ground braid attached.
6. Note the original locations and mounting of the degaussing coil and the dag ground assembly to insure proper reinstallation on the replacement CRT.
   To remove and remount the degaussing coil:
   - Unhook the coil spring from the bottom corners of the CRT ears.
   - Release the braid loop from the upper corners of the CRT ears.
7. Mount the dag ground braid on the replacement CRT. Position the degaussing coil with new ties.
   Dress coil as was on the original CRT.
8. Replace the components on CRT neck and reinstall into cabinet. Verify that all ground wires and circuit board plugs get connected.

IMPORTANT NOTICE

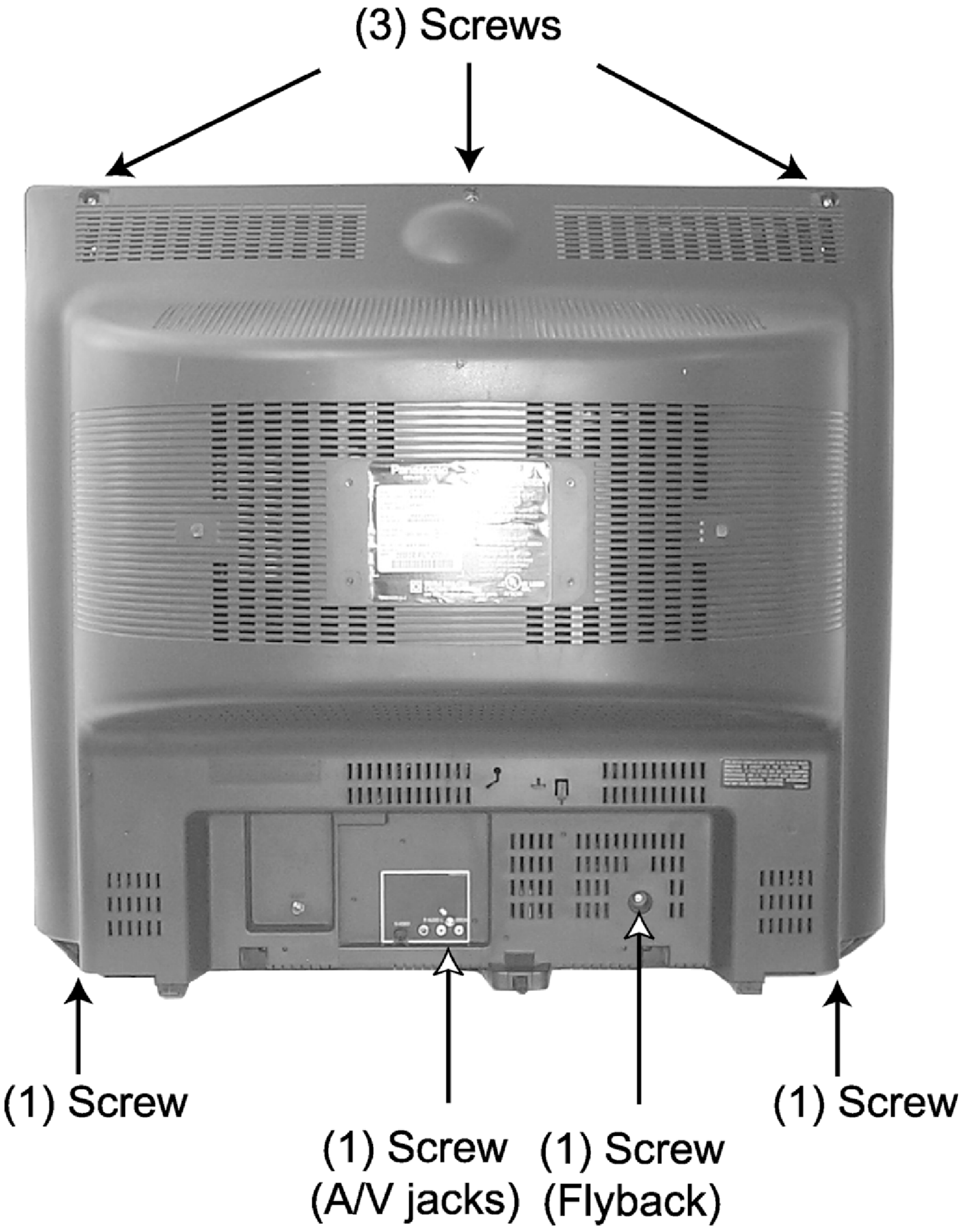
When ordering the CRT, please order CRT and CRT kit also. Please see parts list section for part numbers.

9.2. Back Cover Removal

Back Cover (CT-27C8G).



Back Cover (CT-27L8G/UG/SG, CT-27G8G/UG)



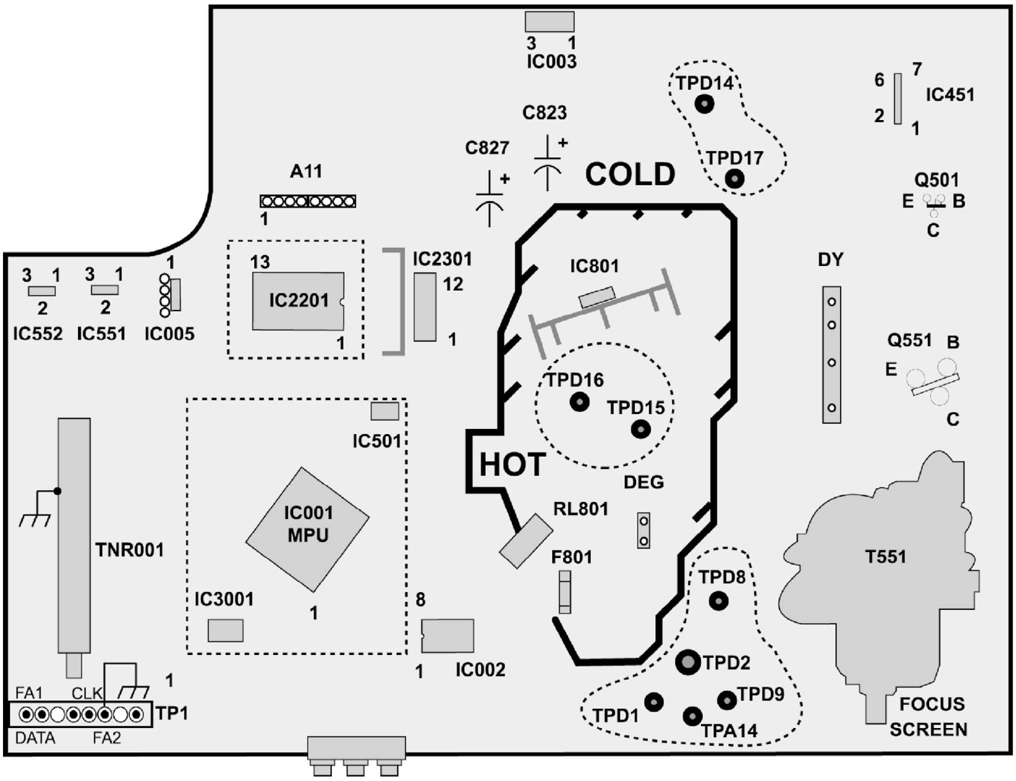
10. Chassis service adjustment procedures

All service adjustments are factory preset and should not require adjustment unless controls and/ or associated components are replaced.

Note:

Connect the (-) lead of the voltmeter to the appropriate ground. Use IC801's heat sink when the HOT ground symbol is used. Otherwise, use COLD ground (Tuner shield, IC451's heat sink or FA2).

Component and Voltage Test Points



Note:

Components and test points within doted areas are located on trace side.

B+ voltage check

1. **Set the BRIGHT and PICTURE to minimum by using the PICTURE menu.**
2. **Connect the DVM between C825 (+ side) or TPD14 and cold ground.**
3. **Confirm that B+ voltage is 131.0V ± 2.0V. This voltage supplies B+ to the horizontal output and flyback circuits.**

Source voltage chart

120V AC line input. Set the BRIGHT and the PICTURE to minimum by using the PICTURE menu. Use cold or hot ground for the (-) lead of the DVM as needed.

A-BOARD	TEST POINT	VOLTAGE
+B2	TPD14	131.0 ± 2.0V
SOUND	C823 (+)	18.1 ± 1.0V
STB12V	C827 (+)	12.8 ± 1.0 V
220V	TPA14	217 ± 10 V
VERTICAL	TPD8	27.4 ± 1.5V
9V	IC551 pin 3	9.0 ± 0.5V
5V	IC552 pin 3	5.0 ± 0.5V
3.3V	IC005 pin 2	3.3 ± 0.3V
EHT	CRT anode	29.25 ± 1.25kV
HEATER	JK351 H-HGND	6.0 ± 0.24V

High voltage check

1. **Select an active TV channel and confirm that horizontal is in sync.**
2. **Adjust BRIGHTNESS and CONTRAST using PICTURE icon menu so video just disappears.**
3. **Using a high voltage meter confirm that the high voltage is 29.25 ± 1.25kV.**

11. Service mode (electronic adjustments)

This receiver has electronic technology using the IC bus concept. It performs as a control function and it replaces many mechanical controls. Instead of adjusting mechanical controls individually, many of the control functions are now performedby using "on screen display menu". (The service adjustment mode).

NOTE

It is suggested that the technician reads all the way through and understand the following procedure for entering/exiting the service adjustment mode; then proceed with the instructions working with the receiver. When becoming familiarwith the procedure, the flow chart for service mode may be used as a quick guide.

Quick entry to service mode

When minor adjustments need to be done to the electronic controls, the method of entering the service mode without removal of the cabinet back is as follows using the remote control:

1. **Select SET-UP icon and select CABLE mode.**
2. **Select TIMER icon and set SLEEP time for 30 Min.**
3. **Press "ACTION" twice to exit menus.**
4. **Tune to the channel 124.**

5. Adjust VOLUME to minimum (0).

6. Press VOL → (decrease) on receiver. Red “CHK” appears in upper corner.

To toggle between aging and service modes:

While the “CHK” is displayed on the left top corner of the CRT, pressing “ACTION” and “VOL” UP on the TV simultaneously will toggle between the modes. Red “CHK” for serviceand yellow “CHK” for aging.

7. Press POWER on the remote control to display the service adjustment modes menu, select adjustment by pressing the volume right/left buttons and channel up/down buttons on the remote and ACTION to enter the adjustment.

MTS	MTSIN	SEPAL	SEPAH	
CLOCK	CLOCK			HHSTH
VIDEO	COLOR	TINT	BRIGH	CONT
	B-Y_G	CUT_G	CUT_R	CUT_B
	BRT	R-DR	B-DR	
HDEF	H POS			
VDEF	VEAMP	V-C	V-S	VPOS
SETID	ID1	ID2	ID3	

Exiting the service mode:

This TV goes out from service mode when it is unplugged or turned OFF. To exit the service mode, turn the TV OFF from or unplug the TV from A.C.

Other method

Press ACTION and POWER on the receiver simultaneously for at least 2 seconds.
The receiver momentarily shuts off; then comes back on tuned to channel 3 with a preset level of sound.
Any programmed channels, channels caption data and some others user defined settings will be erased when exited by pressing ACTION and POWER on receiver.

IMPORTANT NOTE
Always check that the TV exits the service mode.

To confirm colors

When in service mode (red “CHK” is displayed) press RECALL on the remote control to enter the purity field check mode

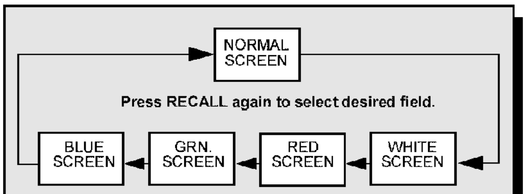


Figure 1. Purity check field mode.

Entering service mode (open-back method)

While the receiver is connected and operating in normal mode, momentarily short test point FA1 (TP1 pin 2) to cold ground (TP1 pin 3).
The receiver enters the aging mode.
Yellow letters "CHK" appear in the upper left corner of the screen. / (The volume right/left and channel up/down will adjust rapidly).

Note:

If service mode is accessed by this method be sure to reset the set after service is performed.

11.1. Service adjustment default values for items

NAME	DESCRIPTION	REGISTER VALUE		
		CT-27C8G	CT-27G8G/UG	CT-27L8G/UG/SG
MTSIN	MTS INPUT LEVEL	17		
SEPAL	MTS LOW LEVEL SEPARATION	08		
SEPAH	MTS HIGH LEVEL SEPARATION	1D		
CLOCK	CLOCK	128		
HHSTH	HHS VOLTAGE LEVEL REFERENCE	8C		
COLOR	COLOR	15		
TINT	TINT	56		
BRIGH	SUB-BRIGHTNESS	4E		
CONT	SUB-CONTRAST	60		
B-Y_G	MAGENTA TINT ADJ	80		
CUT_G	GREEN CUT-OFF	C3		
CUT_R	RED CUT-OFF	0E		
CUT_B	BLUE CUT-OFF	5B		
BRT	BRIGHT	4E		
R-DR	RED DRIVE	00		
B-DR	BLUE DRIVE	00		
H-POS	HORIZONTAL POSITION	70		
VEAMP	VERTICAL SIZE	AA		
V-C	VERTICAL LINEARITY	4C		
V-S	VERTICAL SIZE CORRECTION	00		
VPOS	VERTICAL POSITION	7C		
ID1*	ID SWITCH 1	F0	88	F0

NAME	DESCRIPTION	REGISTER VALUE		
		CT-27C8G	CT-27G8G/UG	CT-27L8G/UG/SG
ID2*	ID SWITCH 2	06	06	06
ID3*	ID SWITCH 3	30	30	30

IMPORTANT:

These table values are approximated and could change due to variation of electrical characteristics in each set, except for the ID switch values.

***Note:**

The correspondent ID switch (ID1,ID2, ID3) data configuration should not be modified in any way. If EEPROM circuit needs to be replaced, these ID values should be configured according with this table.

12. Service adjustments (electronic controls)

NOTE

Please correlate with available pattern on all adjustments

12.1. Sub-Brightness and Contrast / Service DAC adjustment (BRIGH, CONT)

Adjustment of this control is important for setting proper operation of customer brightness and picture controls. Do not adjust the SCREEN VR after the sub-brightness is set.
This adjustment is factory set. Do not adjust unless repairs are made to associated circuit, the CRT Board or when the CRT is replaced.

Preparation

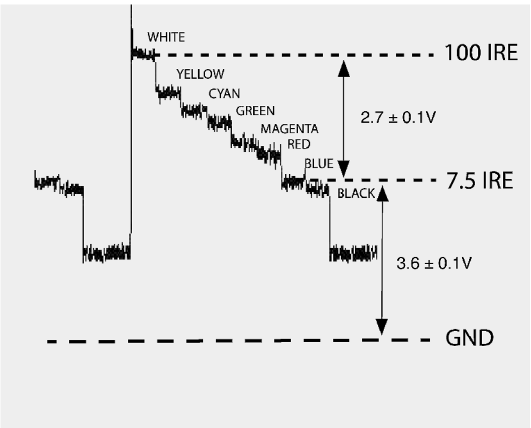
1. Apply a colorbar pattern.
2. Set the PICTURE control to the maximum.
3. Set COLOR control to minimum (no color on picture).
4. Set the BRIGHTNESS control to the center.
5. Set the SHARPNESS control to the center.
6. Connect the oscilloscope to TP35.

Procedure

1. In the service mode, select DAC for brightness adjustment “BRIGH”, and adjust data to obtain 3.6±0.1V between 7.5IRE and

GND level at TP35. (See waveform detail).

2. In service mode, select DAC for contrast adjustment “CONT”, and adjust data to obtain between 7.5IRE and 100IRE level at TP35. (See waveform detail)



12.2. Color output adjustment / Service DAC adjustment (COLOR, TINT)

NOTE

if a rainbow pattern generator is available perform the following procedure; the next section describes the procedure with no rainbow pattern.

Make sure that sub-contrast adjustment was finished prior to perform this adjustment.

PREPARATION

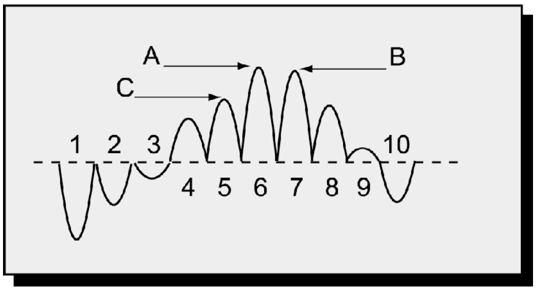
1. Normalize the picture settings.
2. Set the BRIGHTNESS control to minimum.
3. Set the COLOR control to the center.
4. Set the TINT control to the center.
5. Set the PICTURE control to the maximum.
6. Set the SHARPNESS control to the minimum.

PROCEDURE

1. Apply a rainbow color bar pattern.
2. Connect the oscilloscope to TP37.

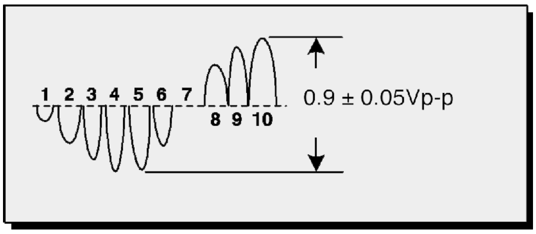
3. In service mode adjust “TINT” register until the waveform measured is as the one shown. Tint level from A and B peaks must be almost in the same level (0.35 Vp).

TP37 Waveform.



4. Connect the oscilloscope to TP35 and GND.
5. Adjust “COLOR” register so that the amplitude is 0.9±0.05Vp-p.

TP35 Waveform.



12.3. Color output adjustment / Service DAC adjustment / (COLOR, TINT, B-Y_G)

NOTE

Color and tint adjustment sets the reference settings for the user controls; It is important to read the procedures.

(NO RAINBOW PATTERN)

Make sure that sub-contrast adjustment was finished prior to perform this adjustment

PREPARATION

Normalize the picture settings.

PROCEDURE

1. Apply a color bar pattern.
2. In service mode adjust “R DR” and “B DR” data to “80”.

3. In service mode adjust “TINT” data so that the color does not become greenish or redish.
4. In service mode adjust “COLOR” data so that the color level is not too high (saturated) or too low (tending to black and white).
5. In service mode adjust “B-Y G” data so that blue and green seem natural.
6. Confirm that saturation and picture are normal (normal image).
7. If image is not satisfactory, repeat adjustment until the image is normal and natural.

NOTE
The image can be compared against other set to see the image quality.

12.4. Color temperature adjustment / (B/W Tracking) / Service DAC Adjust. / (CUT R) (CUT G) (CUT B) (R DR) (B DR)

Minor Touch-Up Method

OBSERVE low and high brightness areas of a B/W picture for proper tracking. Adjust only as required for “good gray scale and warm highlights”.

1. LOW LIGHT areas - In service mode for making electronic adjustments, select CUT R, CUT G, CUT B and adjust the picture for gray.
2. HIGH LIGHT areas - In service mode for making electronic adjustments, select drive R DR, B DR and adjust the picture for warm whites.

Complete adjustment

PREPARATION

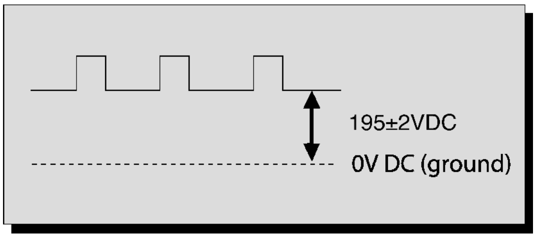
1. Turn the receiver “ON” and allow 30 minutes warm up at WHITE PATTERN.
2. Apply a color bar pattern (with no color).
3. Turn the SCREEN control (part of FBT T551) fully counterclockwise.

4. Preset the following service DACs for best results:

- **BRIGH______________________1 D0**
- **CUT R______________________02 00**
- **CUT G______________________02 00**
- **CUT B______________________02 00**
- **R DR_______________________07 FF**
- **B DR_______________________07 FF**

PROCEDURE

1. **Connect the oscilloscope to KG (CRT-Board).**
2. **In service mode for making electronic adjustment, select "BRIGH" DAC.**
3. **Press RECALL button on the remote control to collapse the raster. (service SW).**
4. **Connect oscilloscope to KG on C-Board and adjust service mode "CUT-G" DAC until 195±2V above DC ground is measured**
5. **Remove the probe from KG.**
6. **Turn screen clockwise slowly until color is slightly appeared.**
7. **Then adjust "CUT R" and "CUT B" until line becomes white.**
8. **Press RECALL button on the remote to restore the raster.**
9. **Adjust "R DR" and "B DR" so the white seems like white and black like black.**
10. **Apply a normal signal and confirm that the image is normal and a good gray scale**
11. **If correction is needed perform minor touch-up method.**



12.5. Deflection adjustments

To reset deflection adjustments

To reset deflection adjustments to factory adjusted default, enter to service mode (with red CHK displayed), press POWER button on remote to display the service menu, then press and hold RECALL button for at least three seconds, a reset messagewill appear in the image.
Use this feature when deflection adjustment gets off adjustment to the point that it cannot be adjusted back easily.

12.5.1. H-Center adjustment

PREPARATION

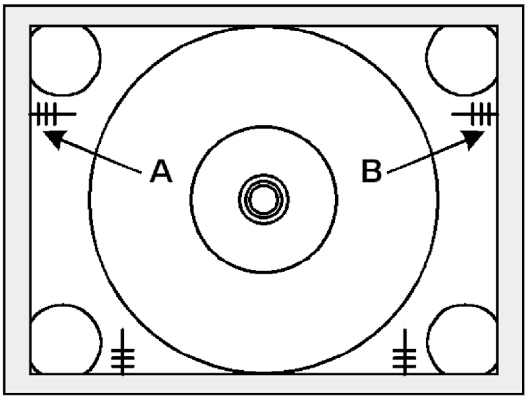
1. Apply a crosshatch pattern.

2. Normalize the picture settings.

PROCEDURE

1. Apply a monoscope pattern to center the picture.

Horizontal Center Adjustment



2. If the horizontal center is not aligned, in service mode adjust "H POS" DATA to adjust the horizontal center of the monoscope pattern to the CRT center.

3. Verify that horizontal width (A & B mark) is within 4.5 ± 0.7.

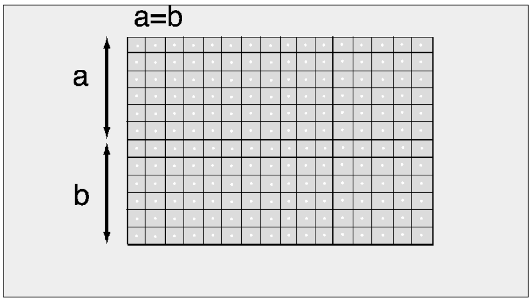
12.5.2. Vertical linearity(V-C), V-Size and V-Position adjustment

PREPARATION

1. Apply a crosshatch pattern
2. Normalize the picture settings.

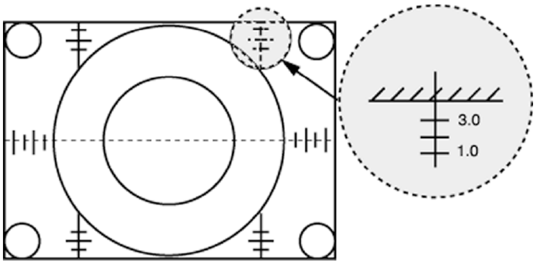
PROCEDURE

1. Enter service mode, select DAC adjustment / “V-POS” and adjust monoscope pattern to the center vertical position of the CRT center mark.
2. Adjust linearity data “V-C” so that interval of “a” is same as “b” (a= b).



3. If the v-position is not at the CRT center, adjust / V position “V POS” DATA again.
4. Apply a monoscope pattern.
5. Confirm that center horizontal line is in center mark on CRT.
6. Adjust “VEAMP” register for correct vertical size by making monoscope round circle leaving 4 marks off the CRT edge.

Vertical centering adjustment.



12.5.3. V-S Correction adjustment

PREPARATION

1. Apply a crosshatch pattern

2. Normalize the picture settings.

PROCEDURE

1. Enter to service mode

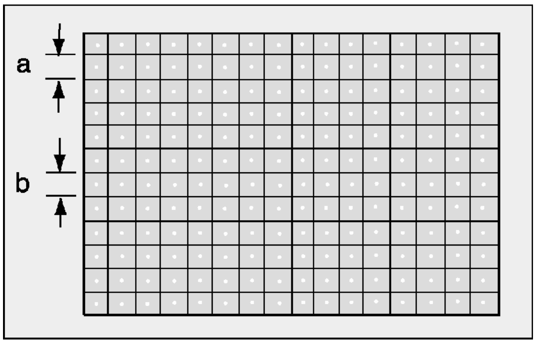
2. Check a and b sizes, If b-a < -1.5mm (in top & bottom extending case)

- Increase “V-S” DATA by one step

NOTE
Repeat “a” and “b” until b-a ± 1.5mm

3. Confirm to make outermost circle of monoscope pattern a correct circle

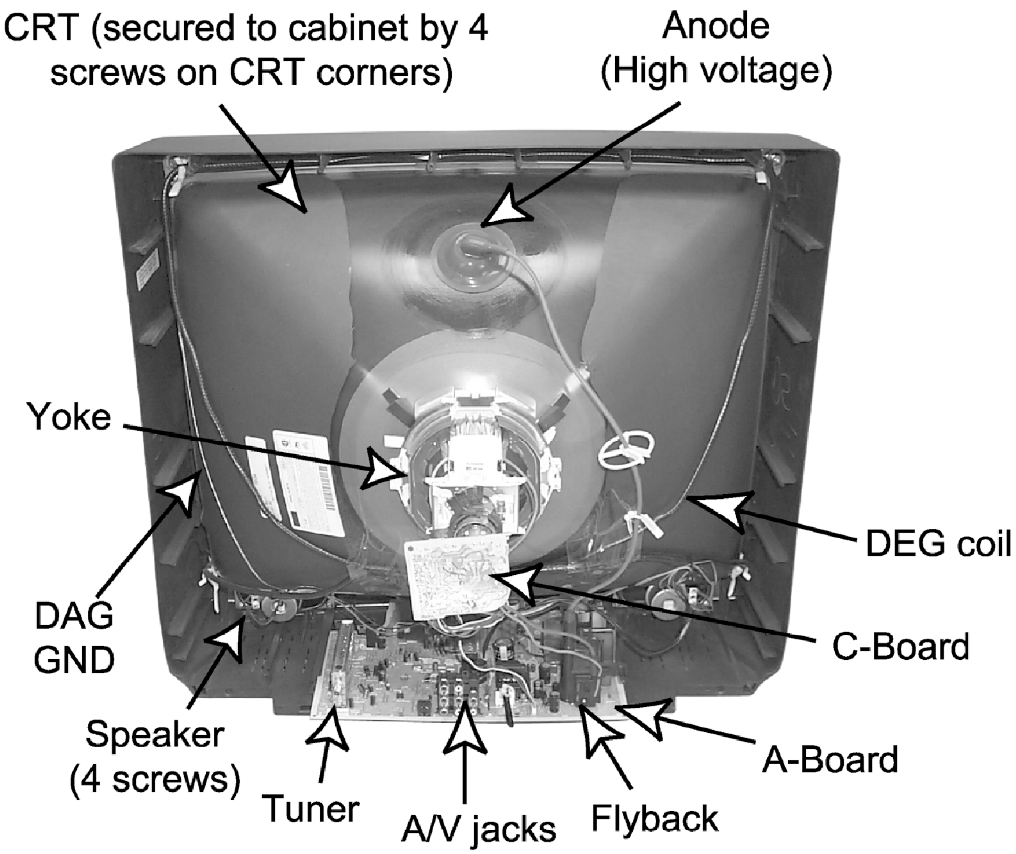
V-Adjustment



13. Identification of Components

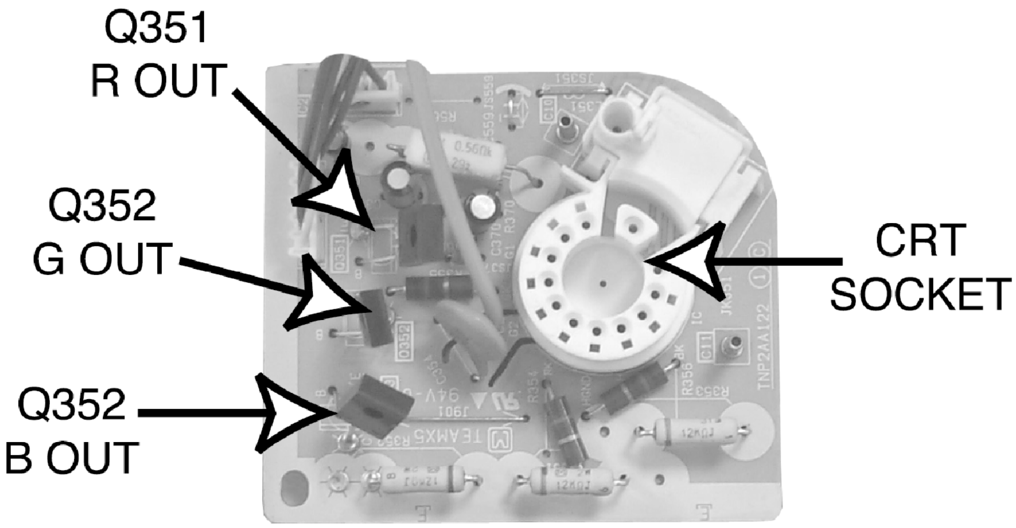
13.1. Chassis Components

Rear view (inside cabinet)



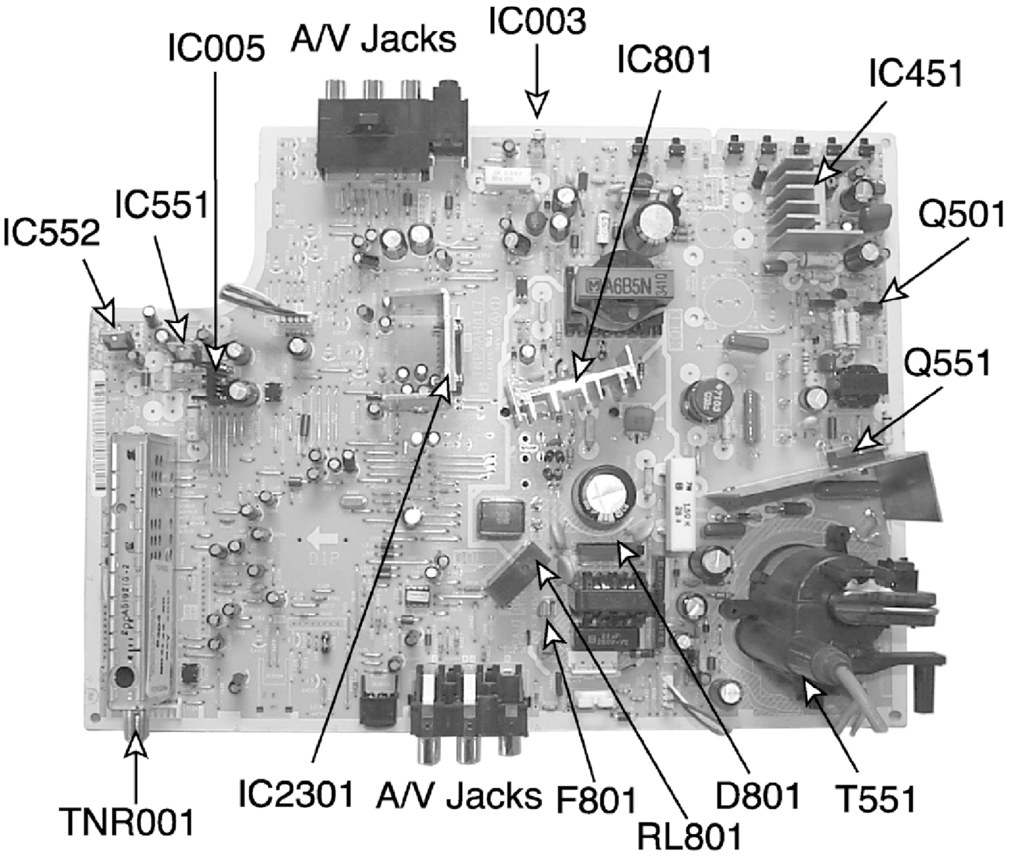
13.1.1. C-Board Chassis

C-Board component locations



13.1.2. A-Board Chassis

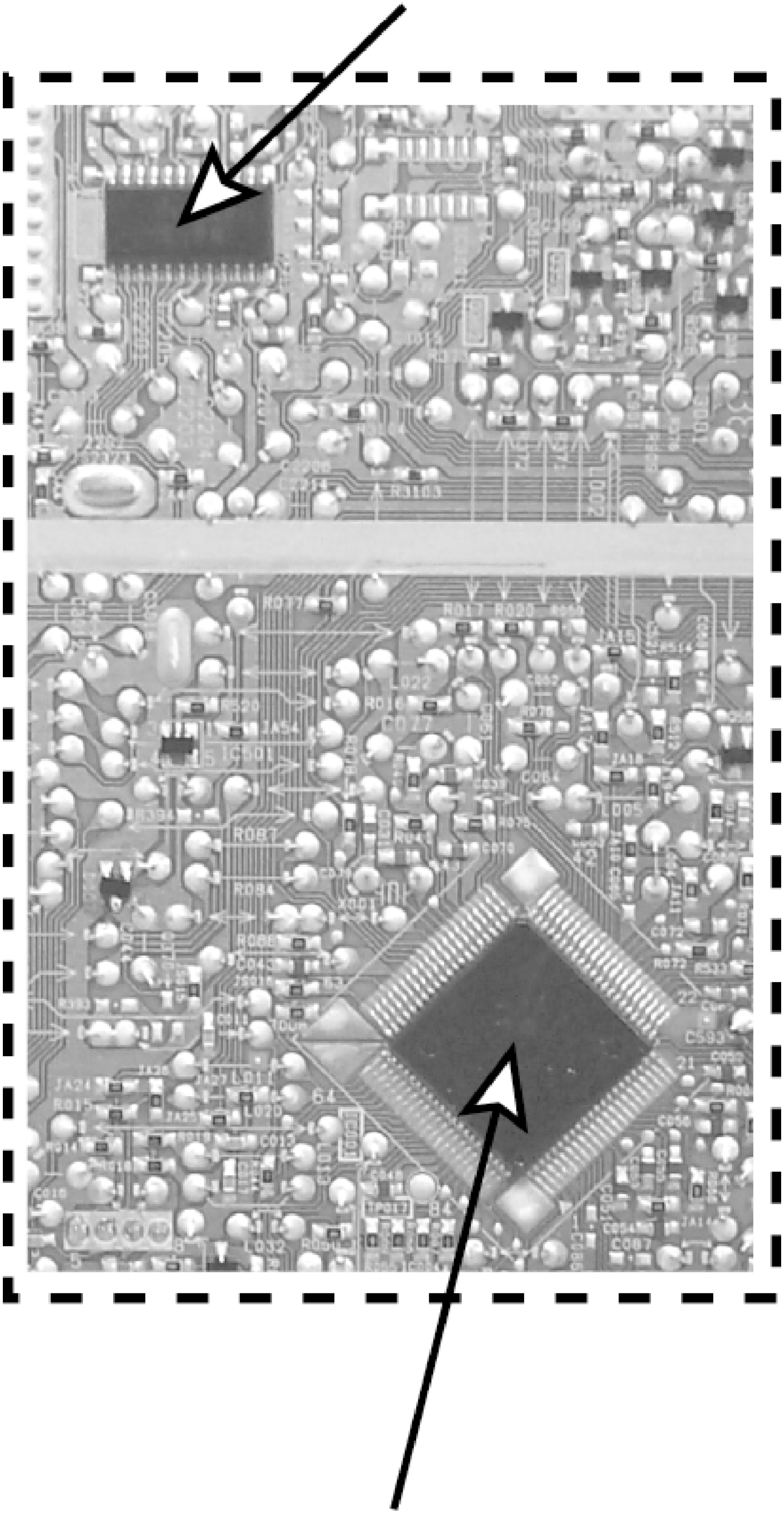
A-Board chassis (Top view)



13.1.3. A-Board Surface-mounted components

A-Board (bottom view)

IC2201



IC001

14. Reference for PDF Colors

DESCRIPTION OF PDF LINK COLORS	
TYPE	DESTINATION
SCHEMATIC	
YELLOW ON IC	IC ON PCB
YELLOW ON CONNECTOR	CONNECTOR ON PCB
YELLOW ON SCHEMATIC	PCB
CYAN	WAVEFORM
GREEN ON SIDE	SCHEMATIC CONTINUED
GREEN ON CONNECTOR	CONNECTOR CONNECTION
BLUE ON IC	VOLTAGE
PCB	
BLUE ON IC	IC ON SCHEMATIC
BLUE ON CONNECTOR	CONNECTOR ON SCHEMATIC
BLUE ON PCB	SCHEMATIC
GREEN ON SIDE	PCB CONTINUED
BLOCK DIAGRAMS	
GREEN ON IC	IC ON SCHEMATIC
GREEN ON SIDE	BLOCK DIAGRAM CONTINUED

15. Conductor Views

15.1. A-Board Printed Circuit (Left Side)

15.2. A-Board& C Board Printed Circuit (Right Side)

16. Block Diagrams

16.1. Video Signal Block Diagram

16.2. Audio Signal Block Diagram

17. Schematics

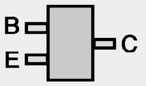
17.1. English Schematic Notes

Notes:

IMPORTANT SAFETY NOTICE

THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH A ⚠ IN THE SCHEMATIC.

CHIP TRANSISTOR LEAD DESIGNATION



SCHEMATIC NOTES

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value notes is inductance in µH.
4. Test point indicated by ; Test point but no pin .
5. Components indicated with ⚠ are critical parts and replacement should be made with manufacture specified replacement parts only.
6. (**BOLD LINE**) indicates the route of B+ supply.
7. The schematic diagrams are current at the time of printing and are subject to change without notice.
8. Ground symbol indicates **HOT GROUND CONNECTION**; indicates COLD GROUND.

NOTE: All other component symbols are used for engineering design purposes.

VOLTAGE MEASUREMENTS

1. Voltage measurement:
   - AC input to the Receiver is 120V. NTSC (HD, 1125i & 525P when applicable) signal generator is connected to the antenna of the Receiver. (Color bar pattern of 100 IRE white and 7.5 IRE black.)
   - All Picture and Audio adjustments are set to Normalize.
     TV ANT/CABLE - (Set-Up Menu) in TV/ANT Mode
     Volume - Min.
     TV/Video SW - TV position
     Audio Mode - Stereo
   - Voltage readings are nominal and may vary ±10% on active devices. Some voltage reading will vary with signal strength and picture content.
   - Supply voltages are nominal.
2. Ground symbol indicates ground lead connection of meter.
   Incorrect ground connection will result in erroneous readings.

*CAUTION: **Incorrect ground connection of the test equipment will result in erroneous readings.***

WAVEFORM MEASUREMENTS

1. ③ indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
2. Taken with an NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black.)
3. Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to “MIN”.
4. All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak altitudes may vary depending on the type of Oscilloscope used and its settings.
5. Ground symbol shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.

CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

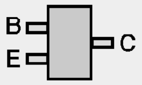
17.2. Notas de Esquemáticos en Español

Notas

NOTA DE SEGURIDAD

LOS DIAGRAMAS ELÉCTRICOS INCLUYEN CARACTERÍSTICAS ESPECIALES MUY IMPORTANTES PARA LA PROTECCIÓN CONTRA RAYOS-X, QUEMADURAS Y DESCARGAS ELÉCTRICAS. CUANDO SE DE SERVICIO ES IMPORTANTE USAR PARA REEMPLAZO DE COMPONENTES CRITICOS, SOLO PARTES ESPECIFICADAS POR EL FABRICANTES. LOS COMPONENTES CRITICOS ESTAN SEÑALADOS EN LOS DIAGRAMAS POR EL SIMBOLO ⚠.

IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN *CHIP*



NOTAS DE LOS DIAGRAMAS

1. Las Resistencias son de Carbón de 1/4W, a menos que se indique otra característica.
2. Los Capacitores son de Cerámica para 50V, a menos que se indique otra característica.
3. El valor indicado de las Bobinas es la inductancia expresada en µH.
4. Los puntos de prueba en la terminal de algún componente son indicados por Los puntos de prueba fuera de los componentes se indican con .
5. Los componentes señalados con el símbolo ⚠ son considerados componentes críticos y deben ser reemplazados sólo con las partes especificadas por el fabricante.
6. (**LINEA GRUESA**) indica las líneas de alimentación de los Voltajes B+.
7. Los diagramas eléctricos están sujetos a cambio sin previo aviso.
8. El símbolo indica que es una conexión a **Tierra Caliente** y el símbolo indica conexión a **Tierra Fría**.

***NOTA:** Los demas símbolos de componentes incluidos son usados con fines de diseño.*

MEDICIÓN DE VOLTAJES

1. Medición de voltaje:
   - El voltaje de entrada al Receptor es de 120V de Corriente Alterna. Un generador de patrones con formato NTSC se conecta a la entrada de la antena. (Patrón de Barras de Colores con 100 IREs para el Blanco y 7.5 IREs para el Negro.)
   - Los ajustes de los Menus Picture y Audio se normalizan.
     En el Menú Set-Up, en la opción ANTENA, se selecciona el modo de CABLE.
     El nivel de Volumen se minimiza.
     De los modos TV y Video, seleccionar el modo TV.
     Seleccionar modo Estereo del Audio.
   - Las mediciones de los voltajes son nominales y pueden variar hasta 10% en componentes en funcionamiento. Las lecturas de los voltajes pueden variar por la potencia de la señal y el contenido de la imagen.
   - Las fuentes de voltajes son nominales.
2. El símbolo indica el tipo de tierra que se utiliza en la conexión del medidor.

PRECAUCION: SI no se utiliza la conexión a la tierra adecuada, se obtendrán mediciones equivocadas y podría dañar el equipo de medición.

MEDICIÓN DE FORMAS DE ONDA

1. Un símbolo como (3) indica el punto para medir una señal. (La medición puede hacerse en el punto con mayor accesibilidad, siempre que sea común al indicado.)
2. Se midieron utilizando un generador con formato NTSC conectado a la terminal de la antena. (Patrón de 8 Barras de Colores EAI, formato NTSC de 100 IREs para el Blanco y 7.5 IREs para el Negro.)
3. Los ajustes de usuario de los Menus PICTURE y AUDIO se normalizaron. Posteriormente el nivel de volumen se ajusta al mínimo.
4. Las formas de onda de Video y Color fueron tomadas con un osciloscopio de banda alta y con un punta de prueba de baja capacitancia (10 a 1). La forma y amplitud de las ondas puede variar según el tipo de osciloscopio que se utilice y sus características.
5. El símbolo de tierra que aparece junto al número de la forma de onda, indica que se utiliza conexión a **Tierra Caliente** en el extremo negativo de la punta de prueba.

PRECAUCION: Si no se utiliza la conexión a la tierra adecuada, se obtendrán mediciones equivocadas y podría dañar el equipo de medición.

17.3. A-Board Schematic TNP2AH047GA/GB (page 1 of 4)

17.4. A-Board Schematic TNP2AH047GA/GB (page 2 of 4)

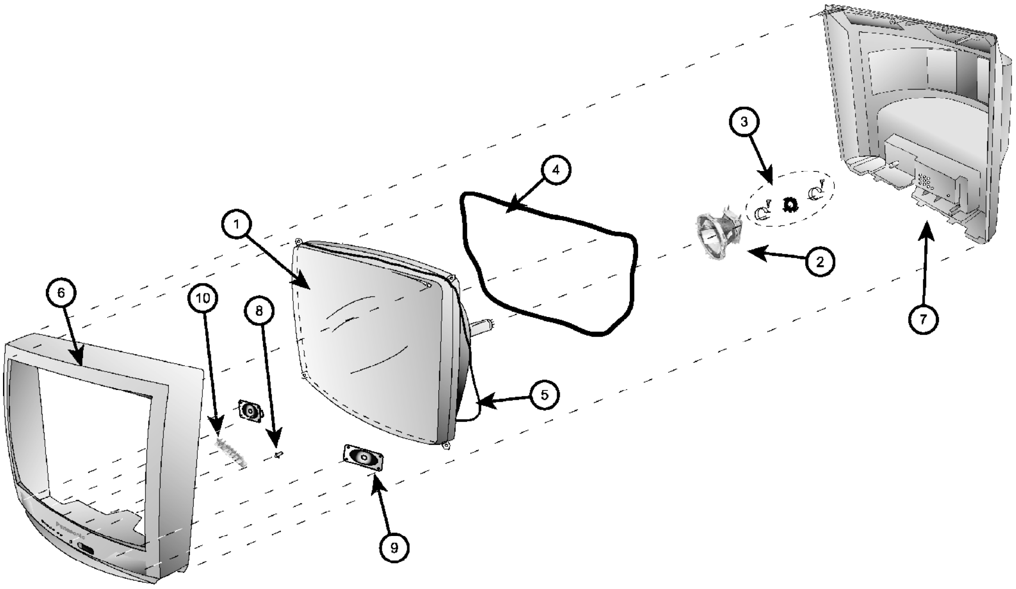
17.5. A-Board Schematic TNP2AH047GA/GB (page 3 of 4)

17.6. A-Board Schematic TNP2AH047GA/GB (page 4 of 4)

17.7. Voltages

17.8. Waveforms

18. Parts Location



19. Parts List

19.1. Parts List Notes

Important Safety Notice

Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use manufacturer's specified parts.

Abbreviation of part name and description

1. Resistor

Example :

ERD25TJ104 **C** 100KΩ, **J**, 1/4W

Type Allowance

Type	Allowance
C : Carbon	F : ± 1%
F : Fuse	G : ± 2%
M : Metal Oxide Metal Film	J : ± 5% K : ± 10%
S : Solid	M : ± 20%
W : Wire Wound	

2. Capacitor

Example :

ECKF1H103ZF **C** 0.01µF, **Z**, 50V

Type Allowance

Type	Allowance
C : Carbon	C : ± 0.25pF
E : Electrolytic	D : ± 0.5pF
P : Polyester Polypropylene	F : ± 1pF G : ± 3%
T : Tantalum	J : ± 5%
	K : ± 10%
	L : ± 15%
	M : ± 20%
	P : ± 100%, -0%
	Z : ± 80%, -20%

19.2. Parts List

Ref. No.	Part No.	Part Name & Description	Remarks
CAPRISTORS			
CRA801	TP00842-51	TAPING GAP TERMINAL	⚠
CAPACITORS			
C003	ECA1HM4R7B	CAP E 4.7UF-50V	
C004	TCJ2VC1H150J	CAP C 15PF-J-50V	
C005	TCJ2VC1H150J	CAP C 15PF-J-50V	
C008	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C009	ECJ2VF1H104Z	CAP C .1UF-Z-50V	
C010	TCJ2VC1H680J	CAP C 68PF-J-50V	
C011	TCJ2VC1H680J	CAP C 68PF-J-50V	
C013	TCJ2VC1H680J	CAP C 68PF-J-50V	
C016	ECA1AM101B	CAP E 100UF-10V	
C017	TCJ2VC1H680J	CAP C 68PF-J-50V	
C018	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C019	ECA0JM102B	CAP E 1000UF-6.3V	
C020	ECA1CM102B	CAP E 1000UF/16V	
C021	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C031	TCJ2VC1H220J	CAP C 22PF-J-50V	
C032	ECA1AM470B	CAP E 47UF-10V	
C034	TCJ2VC1H390J	CAP C 39PF-J-50V	
C035	TCJ2VC1H120J	CAP C 12PF-J-50V	
C038	ECA1CM470B	CAP E 47UF/16V	
C039	TCJ2VB1H221K	CAP C 220PF-K-50V	
C041	ECA1HM2R2B	CAP E 2.2UF-50V	

Ref. No.	Part No.	Part Name & Description	Remarks
C043	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C044	ECA0JM102B	CAP E 1000UF-6.3V	
C046	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C048	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C051	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C052	ECA1CM101B	CAP E 100UF/16V	
C053	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C054	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C055	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C056	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C057	ECEA1CN100UB	CAP E 10UF-16V	
C058	ECEA1CN100UB	CAP E 10UF-16V	
C059	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C060	ECEA1CN220UB	CAP E 22UF-16V	
C061	ECA1HM100B	CAP E 10UF/50V	
C062	ECA1HM100B	CAP E 10UF/50V	
C063	ECJ2VF1C104Z	CAP C .1UF-Z-16V / CT-27G8G CT-27G8UG CT-27L8G CT-27L8UG	
C063	TCJ2VF1C104Z	CAP C .1UF-Z-16V / CT-27L8SG CT-27C8G	
C064	ECA1CM101B	CAP E 100UF/16V	
C066	TCJ2VC1H330J	CAP C 33PF-J-50V	
C067	TCJ2VC1H680J	CAP C 68PF-J-50V	
C068	ECA1CM100B	CAP E 10UF-16V	
C070	ECJ2VF1C104Z	CAP C .1UF-Z-16V / CT-27G8G CT-27G8UG CT-27L8G CT-27L8UG	
C070	TCJ2VF1C104Z	CAP C .1UF-Z-16V / CT-27L8SG CT-27C8G	
C071	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C072	TCJ2VB1H221K	CAP C 220PF-K-50V	
C073	TCJ2VC1H101J	CAP C 101PF-K-50V / CT-27G8G CT-27G8UG CT-27L8UG	
C077	ECA1HM100B	CAP E 10UF/50V	
C079	TCJ2VC1H220J	CAP C 22PF-J-50V	
C083	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C085	ECJ2VB1C104K	CAP C .1UF-K-16V / CT-27G8G CT-27G8UG CT-27L8G CT-27L8UG	
C085	TCJ2VB1C104K	CAP C .1UF-K-16V / CT-27L8SG CT-27C8G	
C350	ECA1CM101B	CAP E 100UF/16V	
C351	TCJ2VC1H331J	CAP C 330PF-J-50V	
C352	TCJ2VC1H331J	CAP C 330PF-J-50V	
C353	TCJ2VC1H331J	CAP C 330PF-J-50V	
C354	ECKW3D102KBN	CAP C .001UF-K-2KVDC	
C357	EEANA1E1R0B	CAP E 1.0UF-25V	
C359	ECA1CM471B	CAP E 470UF-16V	
C360	ECA1HM4R7B	CAP E 4.7UF-50V	
C403	ECEA1CN220UB	CAP E 22UF-16V	
C411	ECQB1H683JF3	CAP P .068UF-J-50V	
C451	ECA1HM2R2B	CAP E 2.2UF-50V	
C452	ECA1CM220B	CAP E 22UF-16V	
C454	ECA1VHG101B	CAP E 100UF-35V	
C455	ECA1EM102E	CAP E 1000UF-25V	
C458	ECA1HM010B	CAP E 1UF-50V	
C459	ECA1VHG471E	CAP E 470UF-35V	
C460	ECQB1224KF3	CAP P .22UF-K-100V	
C461	ECQB1104JF3	CAP P .10UF-J-100V	
C462	ECJ2VF1H103Z	CAP C .01UF-Z-50V	
C505	ECQB1H104JF3	CAP P .10UF-J-50V	
C506	ECKR2H102KB5	CAP C 1000PF-K-500V	
C510	ECCR2H100D5	CAP C 10PF-D-500V	

Ref. No.	Part No.	Part Name & Description	Remarks
C512	ECA2CM100B	CAP E 10UF-160V	
C531	ECA1HM4R7B	CAP E 4.7UF-50V	⚠
C540	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C551	ECA1VHG471B	CAP E 470UF-35V	⚠
C554	ECKR2H561KB5	CAP C 560PF-K-500V	
C555	ECA2EM220E	CAP E 22UF-250V	⚠
C556	ECA1CM471B	CAP E 470UF-16V	⚠
C557	ECKR2H102KB5	CAP C 1000PF-K-500V	
C560	ECEA1HN010UB	CAP E 1UF/50V	
C561	ECEA1HN010UB	CAP E 1UF/50V	
C562	ECKR2H561KB5	CAP C 560PF-K-500V	
C563	ECWH20622JVB	CAP P 6200PF-J-2KV	
C564	ECWH20752JVB	CAP P 7500PF-J-2KV	
C565	ECKW3D471JBP	CAP C 470PF-J-2KV	
C566	ECKW3D181JBP	CAP C 180PF-J-2KV	⚠
C568	ECWF2224JBB	CAP P .22UF-J-200V	⚠
C569	ECWF2474JSR	CAP P .47UF-J-200V	⚠
C570	ECA1CM221B	CAP E 10UF-16V	
C571	ECA1CM220B	CAP E 22UF-16V	
C572	ECA0JM221B	CAP E 220UF-6.3V	
C573	ECA1CM101B	CAP E 100UF/16V	
C575	ECKR2H471KB5	CAP C 470PF-K-500V	
C593	ECA1CM470B	CAP E 47UF/16V	
C605	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C606	ECA0JM221B	CAP E 220UF-6.3V	
C800	ECKR3A152KBP	CAP C 1500PF-K-1KVDC	
C801	ECKWAE472ZED	CAP C 4700PF-Z-500V	⚠
C802	ECKWAE472ZED	CAP C 4700PF-Z-500V	⚠
C803	ECKWAE472ZED	CAP C 4700PF-Z-500V	⚠
C805	EC0S2DA331BB	CAP E 330UF/200V	⚠
C806	ECQM4103KZW	CAP P .01UF-K-400V	
C808	ECA1HM470B	CAP E 47UF-50V	
C809	ECKR2H152KB5	CAP C .0015UF-K-500V	
C810	ECKR1H471KB5	CAP C 470PF-K-50V	
C812	ECQU2A224MVA	CAP P .22UF-M-250VAC	⚠
C813	ECQU2A153MVA	CAP P .015UF-M-250VAC	⚠
C814	ECQU2A153MVA	CAP P .015UF-M-250VAC	⚠
C820	ECA1CM101B	CAP E 100UF/16V	
C821	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
C822	ECKR3A221KBP	CAP C 220PF-K-1KV	
C823	ECA1VM471B	CAP E 470UF-35V	⚠
C824	ECKR3A102KBP	CAP C 1000PF-K-1KV	
C825	EEUMG2C221S	CAP E 220UF-160V	⚠
C826	ECKR3A471KBP	CAP C 470PF-K-1KV	
C827	ECA1CM102B	CAP E 1000UF/16V	
C828	ECA2CHG470E	CAP E 47UF-160V	
C829	ECA1CM471B	CAP E 470UF-16V	
C830	ECA1CM471B	CAP E 470UF-16V	
C2201	ECA1HM4R7B	CAP E 4.7UF-50V	

Ref. No.	Part No.	Part Name & Description	Remarks
C2202	ECA1HM2R2B	CAP E 2.2UF-50V	
C2203	ECA1HM4R7B	CAP E 4.7UF-50V	
C2204	AP106K016CAE	CAP T 10UF/16V	
C2205	ECA1HMR33B	CAP E .33UF-50V	
C2206	ECQB1H223JF3	CAP P .022UF-J-50V	
C2207	AP335K016CAE	CAP T 3.3UF/16V	
C2208	ECJ2VB1C104K	CAP C .1UF-K-16V / CT-27G8G CT-27G8UG CT-27L8G CT-27L8UG	
C2208	TCJ2VB1C104K	CAP C .1UF-K-16V / CT-27L8SG CT-27C8G	
C2209	ECJ2VB1C104K	CAP C .1UF-K-16V CT-27G8G CT-27G8UG CT-27L8G CT-27L8UG	
C2209	TCJ2VB1C104K	CAP C .1UF-K-16V / CT-27L8SG CT-27C8G	
C2210	ECJ2VB1C104K	CAP C .1UF-K-16V CT-27G8G / CT-27G8UG CT-27L8G CT-27L8UG	
C2210	TCJ2VB1C104K	CAP C .1UF-K-16V / CT-27L8SG CT-27C8G	
C2212	ECQB1H473JF3	CAP P .047UF-J-50V	
C2213	ECA1HMR47B	CAP E .47UF-50V	
C2214	ECA1AM101B	CAP E 100UF-10V	
C2215	EEANA1E100B	CAP E 10UF-25V	
C2216	TCJ2VC1H100D	CAP C 10PF-J-50V	
C2217	ECJ2VB1H102K	CAP C .001UF-K-50V	
C2218	ECJ2VB1H102K	CAP C .001UF-K-50V	
C2219	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C2220	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C2301	ECA1EM102E	CAP E 1000UF-25V	
C2302	ECA1HM010B	CAP E 1UF-50V	
C2304	ECA1CM101B	CAP E 100UF/16V	
C2307	ECA1CM102B	CAP E 1000UF/16V	
C2312	ECA1HM010B	CAP E 1UF-50V	
C2313	ECA1EM220B	CAP E 22UF-25V	
C2317	ECA1CM102B	CAP E 1000UF/16V	
C2350	ECA1CM101B	CAP E 100UF/16V	
C2520	ECJ2VF1H103V	CAP C .010UF-V-50V	
C3001	ECA1CM220B	CAP E 22UF-16V	
C3002	ECA1CM220B	CAP E 22UF-16V	
C3011	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C3012	ECA1HM010B	CAP E 1UF-50V	
C3013	ECA1CM100B	CAP E 10UF-16V	
C3014	ECA1CM100B	CAP E 10UF-16V	
C3018	ECA1HM010B	CAP E 1UF-50V	
C3019	ECJ2VF1C105Z	CAP C 1.0UF-Z-16V	
C3025	ECA1HM100B	CAP E 10UF/50V	
C3234	ECA1CM470B	CAP E 47UF/16V	
C3240	TCJ2VF1H103Z	CAP C .01UF-Z-50V	
DIODES			
D001	MAZ30680ML	DIODE	
D002	MA2C165001VT	DIODE	
D003	MAZ30510HL	DIODE SILICON	
D006	MAZ33000HL	DIODE	
D007	MAZ30510HL	DIODE SILICON	
D010	MAZ40510MF	DIODE ZENER	
D055	MAZ40330MF	DIODE ZENER	
D360	MA2C165001VT	DIODE	
D380	MA2C029WBF	DIODE	
D451	B0EAKL000008	DIODE RECTIFIER	
D452	MA2C165001VT	DIODE	
D505	D1NL40V70	DIODE	

Ref. No.	Part No.	Part Name & Description	Remarks
D531	MA2C165001VT	DIODE	⚠
D551	B0HAMM000072	DIODE FAST RECOVERY	⚠
D554	AU02V0	DIODE	⚠
D556	MA2C165001VT	DIODE	
D557	MAZ40270LF	DIODE ZENER	
D558	B0HANV000008	DIODE	
D559	EU2	DIODE	
D561	AU02V0	DIODE	⚠
D606	MA2C165001VT	DIODE	
D801	D3SBA60-4103	DIODE	⚠
D803	MAZ41200MF	DIODE ZENER	
D806	TAP2AA0003	PTC 3-OHM	⚠
D808	SARS01V1	DIODE	
D809	B0HAJP000015	DIODE	
D810	B0HAJP000015	DIODE	
D811	B0HAJP000015	DIODE	
D820	MA2C165001VT	DIODE	
D821	MAZ40470HF	DIODE ZENER	
D822	B0HAMM000103	DIODE	
D823	S3L60P154004	DIODE	⚠
D824	B0HAMM000072	DIODE FAST RECOVERY	
D2302	MAZ43000MF	DIODE ZENER	
D2305	CVS20A120MTA	DIODE	
D2307	CVS20A120MTA	DIODE	
D2350	MAZ40680MF	DIODE ZENER	
D2353	MA2C165001VT	DIODE	
D2355	MAZ30510HL	DIODE SILICON	
D3001	MAZ40510MF	DIODE ZENER	
D3004	CVS20A120MTA	DIODE	
D3005	CVS20A120MTA	DIODE	
D3007	MAZ31100ML	DIODE ZENER	
D3008	MAZ31100ML	DIODE ZENER	
D3009	MAZ31100ML	DIODE ZENER	
D3010	MAZ31100ML	DIODE ZENER	
D3011	MAZ31100ML	DIODE ZENER	
D3012	MAZ31100ML	DIODE ZENER	
D3017	MAZ31100ML	DIODE ZENER	
D3018	MAZ31100ML	DIODE ZENER	
D3019	CVS20A120MTA	DIODE	
D3021	CVS20A120MTA	DIODE	
D3023	MAZ31100ML	DIODE ZENER	
D3024	MAZ31100ML	DIODE ZENER	
FUSES			
F801	XBA2A00101	FUSE 6.3A 125V	⚠
INTEGRATED CIRCUITS			
IC001	MN101E03GTB3	MPU	
IC002	TVR2AJ165S	EEPROM / CT-27G8G CT-27G8UG	
IC002	TVR2AJ166S	EEPROM / CT-27L8G CT-27L8UG CT-27L8SG / CT-27C8G	
IC003	GP1UE282GK	IR SENSOR	
IC004	PST9128NR	RESET	
IC005	PQ3RD13	3.3V STBY REGULATOR	

Ref. No.	Part No.	Part Name & Description	Remarks
IC451	AN5522	VERTICAL OUTPUT AMPLIFIER	
IC501	NC7SZU04M5X	H-DRIVE INVERTER	
IC551	AN78M09LB	9V VOLTAGE REGULATOR	
IC552	AN78M05LB	5V VOLTAGE REGULATOR	
IC801	STRW5634	MAIN POWER SUPPLY	⚠
IC802	0N3171RLF	OPTO-COUPLER	⚠
IC2201	AN5829S-E1V	MTS	
IC2301	AN17807A	AUDIO AMPLIFIER	
IC3001	MM1114XFBE	VIDEO SWITCH	
COILS			
L002	EXCELSA39V	FERRITE BEAD	
L003	EXCELDR35V	FERRITE BEAD	
L005	EXCELSA35V	FERRITE BEAD	
L006	EXCELSA35T	FERRITE BEAD	
L007	ELESN330JA	COIL PEAKING 33UH	
L008	G0C470KA0029	COIL PEAKING 47UH	
L010	G0C2R2KA0029	COIL PEAKING 2.2UH	
L011	EXCELSA26T	FERRITE BEAD	
L012	G0C2R2KA0029	COIL PEAKING 2.2UH	
L013	EXCELSA26T	FERRITE BEAD	
L014	ELESN180KA	COIL PEAKING 18UH	
L015	ELESN3R3JA	COIL PEAKING 3.3UH	
L020	EXCELSA26T	FERRITE BEAD	
L032	EXCELSA26T	FERRITE BEAD	
L108	EXCELSA35V	FERRITE BEAD	
L110	G0C101KA0021	COIL PEAKING 100UH / CT-27G8G CT-27G8UG CT-27L8G CT-27L8UG	
L148	EXCELSA35T	FERRITE BEAD	
L245	EXCELSA35V	FERRITE BEAD	
L312	EXCELSA24T	FERRITE BEAD	
L551	ELH5L7103	COIL	⚠
L552	EXCELSA39V	FERRITE BEAD	
L801	ELF21V018A	COIL	
L802	TALL08T470KA	COIL	
L803	TALL08T680KA	COIL	
L804	EXCELDR35V	FERRITE BEAD	
L805	EXCELDR35V	FERRITE BEAD	
L806	EXCELDR35V	FERRITE BEAD	
L807	EXCELSA35V	FERRITE BEAD	
L808	EXCELSA35V	FERRITE BEAD	
L2301	EXCELDR35V	FERRITE BEAD / CT-27L8G CT-27L8UG CT-27L8SG CT-27C8G	
L2301	EXCELSA35V	FERRITE BEAD	
L2305	EXCELSA35V	FERRITE BEAD	
TRANSISTORS			
Q001	2SD601ARTX	TRANSISTOR	
Q070	2SD601ARTX	TRANSISTOR	
Q092	2SB709ARTX	TRANSISTOR	
Q351	2SC3063RL	TRANSISTOR	
Q352	2SC3063RL	TRANSISTOR	
Q353	2SC3063RL	TRANSISTOR	
Q354	2SD601ARTX	TRANSISTOR	
Q355	2SD601ARTX	TRANSISTOR	
Q356	2SD601ARTX	TRANSISTOR	

Ref. No.	Part No.	Part Name & Description	Remarks
Q357	2SD601ARTX	TRANSISTOR	
Q358	2SD601ARTX	TRANSISTOR	
Q359	2SD601ARTX	TRANSISTOR	
Q360	2SB709ARTX	TRANSISTOR	
Q361	2SB709ARTX	TRANSISTOR	
Q362	2SB709ARTX	TRANSISTOR	
Q411	2SB0710AQL	TRANSISTOR	
Q412	2SD0602AQL	TRANSISTOR	
Q451	2SB709ARTX	TRANSISTOR	
Q501	2SC4212HLB	TRANSISTOR	
Q551	2SC5902000LK	TRANSISTOR	⚠
Q560	2SB709ARTX	TRANSISTOR	
Q605	2SB709ARTX	TRANSISTOR	
Q606	2SD601ARTX	TRANSISTOR	
Q801	2SD601ARTX	TRANSISTOR	
Q802	2SD601ARTX	TRANSISTOR	
Q820	2SA1767QTA	TRANSISTOR	
Q830	2SB1011QRL	TRANSISTOR	
Q831	2SC1473ATA	TRANSISTOR	
Q2350	2SB709ARTX	TRANSISTOR	
Q3001	2SD601ARTX	TRANSISTOR	
Q3002	2SD601ARTX	TRANSISTOR	
RELAYS			
RL801	K6B1AGA00042	RELAY	⚠
RESISTORS			
R001	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R004	ERJ6GEYJ562V	RES M 5.6K-J-1/10W	
R005	ERJ6GEYJ471V	RES M 470-J-1/10W	
R007	ERJ6GEYJ471V	RES M 470-J-1/10W	
R008	ERJ6GEYJ223V	RES M 22K-J-1/10W	
R009	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R014	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R015	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R016	ERJ6GEYJ221V	RES M 220-J-1/10W	
R017	ERJ6GEYJ221V	RES M 220-J-1/10W	
R018	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R019	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R020	ERJ6GEYJ221V	RES M 220-J-1/10W	
R021	ERJ6GEYJ101V	RES M 100-J-1/10W	
R022	ERJ6GEYJ101V	RES M 100-J-1/10W	
R023	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R024	ERJ6GEYJ101V	RES M 100-J-1/10W	
R025	ERJ6GEYJ101V	RES M 100-J-1/10W	
R026	ERDS1FJ561P	RES C 560-J-1/2W	
R032	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R033	ERJ6GEYJ222V	RES M 2.2K-J-1/10W	
R034	ERJ6GEYJ222V	RES M 2.2K-J-1/10W	
R035	ERJ6GEYJ332V	RES M 3.3K-J-1/10W	
R036	ERJ6GEYJ512V	RES M 5.1K-J-1/10W	
R037	ERJ6GEYJ912V	RES M 9.1K-J-1/10W	
R038	ERJ6GEYJ223V	RES M 22K-J-1/10W	
R039	ERDS2TJ102T	RES C 1K-J-1/4W	
R040	ERJ6GEYJ680V	RES M 68-J-1/10W	

Ref. No.	Part No.	Part Name & Description	Remarks
R041	ERJ6GEYJ222V	RES M 2.2K-J-1/10W	
R042	ERJ6GEYJ222V	RES M 2.2K-J-1/10W	
R043	ERJ6GEYJ153V	RES M 15K-J-1/10W	
R044	ERJ6GEYJ101V	RES M 100-J-1/10W	
R045	ERDS2TJ101T	RES C 100-J-1/4W	
R046	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R047	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R048	ERJ6GEYJ101V	RES M 100-J-1/10W	
R050	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R052	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R053	ERJ6GEYJ101V	RES M 100-J-1/10W	
R055	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R056	ERJ6GEYJ471V	RES M 470-J-1/10W	
R057	ERJ6GEYJ101V	RES M 100-J-1/10W	
R060	ERJ6GEYJ101V	RES M 100-J-1/10W	
R061	ERJ6GEYJ221V	RES M 220-J-1/10W	
R062	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R063	ERDS2TJ101T	RES C 100-J-1/4W	
R064	ERJ6GEYJ473V	RES M 47K-J-1/10W	
R065	ERDS2TJ101T	RES C 100-J-1/4W	
R066	ERJ6GEYJ223V	RES M 22K-J-1/10W	
R067	ERJ6GEYJ223V	RES M 22K-J-1/10W	
R068	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R069	ERJ6GEYJ123V	RES M 12K-J-1/10W	
R070	ERJ6GEYJ561V	RES M 560-J-1/10W	
R071	ERJ6GEYJ680V	RES M 68-J-1/10W	
R072	ERJ6GEYJ222V	RES M 2.2K-J-1/10W	
R073	ERJ6GEYJ471V	RES M 470-J-1/10W	
R074	ERJ6GEYJ471V	RES M 470-J-1/10W	
R075	ERJ6ENF3902V	RES M 39K-F-1/10W	
R076	ERJ6ENF6201V	RES M 6.2K-F-1/10W	
R077	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R078	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R084	ERDS2TJ182T	RES C 1.8K-J-1/4W	
R087	ERDS2TJ221T	RES C 220-J-1/4W	
R088	ERJ6GEYJ223V	RES M 22K-J-1/10W	
R092	ERJ6GEYJ473V	RES M 47K-J-1/10W	
R093	ERJ6GEYJ331V	RES M 330-J-1/10W	
R351	ERG2FJ123H	RES M 12K-J-2W	
R352	ERG2FJ123H	RES M 12K-J-2W	
R353	ERG2FJ123H	RES M 12K-J-2W	
R354	ERC12GK272C	RES C 2.7K-K-1/2W	
R355	ERC12GK272C	RES C 2.7K-K-1/2W	
R356	ERC12GK272C	RES C 2.7K-K-1/2W	
R357	ERJ6ENF3000V	RES M 300-F-1/10W	
R358	ERJ6ENF3000V	RES M 300-F-1/10W	
R359	ERJ6ENF3000V	RES M 300-F-1/10W	
R360	ERJ6ENF7500V	RES M 750-F-1/10W	
R361	ERJ6ENF7500V	RES M 750-F-1/10W	
R362	ERJ6ENF7500V	RES M 750-F-1/10W	
R363	ERJ6GEYJ101V	RES M 100-J-1/10W	
R364	ERJ6GEYJ101V	RES M 100-J-1/10W	
R365	ERJ6GEYJ101V	RES M 100-J-1/10W	
R371	ERJ6GEYJ101V	RES M 100-J-1/10W	

Ref. No.	Part No.	Part Name & Description	Remarks
R372	**ERJ6GEYJ101V**	**RES M 100-J-1/10W**	
R373	**ERJ6GEYJ101V**	**RES M 100-J-1/10W**	
R374	**ERJ6GEYJ102V**	**RES M 1K-J-1/10W**	
R375	**ERJ6GEYJ102V**	**RES M 1K-J-1/10W**	
R376	**ERJ6GEYJ102V**	**RES M 1K-J-1/10W**	
R377	**ERJ6ENF3300V**	**RES M 330-F-1/10W**	
R378	**ERJ6ENF3300V**	**RES M 330-F-1/10W**	
R379	**ERJ6ENF3300V**	**RES M 330-F-1/10W**	
R380	**ERJ6ENF1501V**	**RES M 1.5K-F-1/10W**	
R381	**ERJ6ENF1501V**	**RES M 1.5K-F-1/10W**	
R382	**ERJ6ENF1501V**	**RES M 1.5K-F-1/10W**	
R383	**ERJ6ENF3481V**	**RES M 3.48K-F-1/10W**	
R384	**ERJ6ENF7500V**	**RES M 750-F-1/10W**	
R385	**ERDS1FJ150P**	**RES C 15-J-1/2W**	
R389	**ERJ6GEYJ102V**	**RES M 1K-J-1/10W**	
R390	**ERJ6GEYJ102V**	**RES M 1K-J-1/10W**	
R391	**ERJ6GEYJ102V**	**RES M 1K-J-1/10W**	
R411	**ERJ6GEYJ682V**	**RES M 6.8K-J-1/10W**	
R412	**ERJ6GEYJ471V**	**RES M 470-J-1/10W**	
R413	**ERJ6GEYJ103V**	**RES M 10K-J-1/10W**	
R414	**ERJ6GEYJ471V**	**RES M 470-J-1/10W**	
R451	**ERDS1FJ1R0P**	**RES C 1.0-J-1/2W**	
R453	**ERJ6GEYJ333V**	**RES M 33K-J-1/10W**	
R454	**ERJ6GEYJ363V**	**RES M 36K-J-1/10W**	
R455	**ERJ6GEYJ103V**	**RES M 10K-J-1/10W**	
R456	**ERG3FJ151**	**RES M 150-J-3W**	
R457	**ERDS1FJ1R0P**	**RES C 1.0-J-1/2W**	
R458	**ERJ6GEYJ123V**	**RES M 12K-J-1/10W**	
R459	**ERJ6GEYJ152V**	**RES M 1.5K-J-1/10W**	
R462	**ERJ6GEYJ472V**	**RES M 4.7K-J-1/10W**	
R463	**ERJ6GEYJ473V**	**RES M 47K-J-1/10W**	
R464	**ERJ6GEYJ103V**	**RES M 10K-J-1/10W**	
R468	**ERJ6ENF1962V**	**RES M 19.6K-F-1/10W**	
R469	**ERJ6ENF5621V**	**RES M 5.62K-F-1/10W**	
R471	**ERJ6GEYJ223V**	**RES M 22K-J-1/10W**	
R504	**ERDS2TJ102T**	**RES C 1K-J-1/4W**	
R505	**ERJ6GEYJ562V**	**RES M 5.6K-J-1/10W**	
R506	**ERG1SJ562P**	**RES C 5.6K-J-1W**	
R507	**ER0S2THF1802**	**RES M 18K-F-1/4W**	⚠
R509	**ERJ6ENF1002V**	**RES M 10K-F-1/10W**	⚠
R510	**ERG3FJ562**	**RES M 5.6K-J-3W**	⚠
R511	**ERG3FJ562**	**RES M 5.6K-J-3W**	⚠
R512	**ERJ6GEYJ222V**	**RES M 2.2K-J-1/10W**	
R514	**ERJ6GEYJ392V**	**RES M 3.9K-J-1/10W**	
R520	**ERJ6GEYJ471V**	**RES M 470-J-1/10W**	
R532	**ERJ6ENF2202V**	**RES M 22K-F-1/10W**	⚠
R533	**ERJ6ENF1003V**	**RES M 100K-F-1/10W**	⚠
R540	**ERJ6GEYJ105V**	**RES M 1M-J-1/10W**	
R541	**ERDS2TJ274T**	**RES C 27K-J-1/4W**	
R542	**ERJ6GEYJ124V**	**RES M 120K-J-1/10W**	
R551	**ERX12SJR47P**	**RES M .47-J-1/2W**	⚠

Ref. No.	Part No.	Part Name & Description	Remarks
R552	ERDS1FJ1R0T	RES C 1.0-J-1/2W	⚠
R557	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R558	ERQ1CKPR56S	RES F .56-K-1W	⚠
R559	ERG2FJ683H	RES M 12K-J-2W	
R561	ERG2FJ102H	RES M 1K-J-2W	
R562	ERG2FJ270H	RES M 27-J-2W	
R563	ERG3FJ150H	RES M 15-J-3W	
R564	ERDS2TJ104T	RES C 100K-J-1/4W	
R565	ERDS2TJ393T	RES C 39K-J-1/4W	
R592	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R605	ERDS2TJ103T	RES C 10K-J-1/4W	
R606	ERJ6GEYJ562V	RES M 5.6K-J-1/10W	
R607	ERJ6GEYJ102V	RES M 1K-J-1/10W	
R608	ERJ6GEYJ104V	RES M 100K-J-1/10W	
R802	ERG2FJ104H	RES M 100K-J-2W	
R804	ERG1DJ224P	RES M 220K-J-1W	
R805	ERX2FZJR15H	RES M .18-J-2W	⚠
R806	ERX12SJ1R5P	RES M 4.5-J-1/2W	⚠
R807	ERDS2TJ681T	RES C 680-J-1/4W	
R808	ERX12SJ1R5P	RES M 1.5-J-1/2W	
R809	ERDS2TJ472T	RES C 4.7K-J-1/4	
R810	ERDS2TJ221T	RES C 220-J-1/4W	
R815	ERC12ZGK825D	RES C 8.2MEG-K-1/2W	⚠
R821	ERDS1FJ1R0T	RES C 1.0-J-1/2W	
R822	ERDS1FJ1R0T	RES C 1.0-J-1/2W	
R823	ERDS1FJ272T	RES C 2.7K-J-1/2W	
R824	ERDS2TJ223T	RES C 22K-J-1/4W	
R825	ERDS2TJ272T	RES C 2.7K-J-1/4W	
R827	ERJ6GEYJ153V	RES M 15K-J-1/10W	
R828	ERJ6GEYJ104V	RES M 100K-J-1/10W	
R829	ERJ6GEYJ104V	RES M 100K-J-1/10W	
R830	ERG2FJ273H	RES M 27K-J-2W	
R831	ERDS2TJ682T	RES C 6.8K-J-1/4W	
R832	ERJ6GEYJ122V	RES M 1.2K-J-1/10W	
R833	ERJ6GEYJ473V	RES M 47K-J-1/10W	
R834	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R837	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R838	ERJ6GEYJ103V	RES M 10K-J-1/10W	
R850	ERQ12HJR56P	RES F .56-J-1/2W	⚠
R202	ERJ6GEYJ222V	RES M 2.2K-J-1/10W	
R2201	ERJ6GEYJ224V	RES M 220K-J-1/10W	
R2203	ERJ6GEYJ272V	RES M 2.7K-J-1/10W	
R2204	ERJ6GEYJ272V	RES M 2.7K-J-1/10W	
R2205	ERDS2TJ101T	RES C 100-J-1/4W	
R2206	ERDS2TJ273T	RES C 27K-J-1/4W	
R2207	ERJ6GEYJ152V	RES M 1.5K-J-1/10W	
R2208	ERJ6GEYJ152V	RES M 1.5K-J-1/10W	
R2301	ERQ2CJP5R6S	RES F 5.6-J-2W	
R2307	ERDS2TJ222T	RES C 2.2K-J-1/4W	
R2351	ERJ6GEYJ751V	RES M 750-J-1/10W	
R2352	ERJ6GEYJ152V	RES M 1.5K-J-1/10W	
R2356	ERJ6GEYJ101V	RES M 100-J-1/10W	

Ref. No.	Part No.	Part Name & Description	Remarks
R2357	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R2362	ERJ6GEYJ221V	RES M 220-J-1/10W	
R2364	ERJ6ENF1001V	RES M 1K-F-1/10W	
R2370	ERJ6GEYJ222V	RES M 2.2K-J-1/10W	
R3002	ERJ6GEYJ221V	RES M 220-J-1/10W	
R3003	ERJ6GEYJ221V	RES M 220-J-1/10W	
R3004	ERDS2TJ101T	RES C 100-J-1/4W	
R3005	ERJ6GEYJ334V	RES M 330K-J-1/10W	
R3006	ERJ6GEYJ151V	RES M 150-J-1/10W	
R3007	ERJ6GEYJ151V	RES M 150-J-1/10W	
R3008	ERJ6ENF75R0V	RES M 75.0-F-1/10W	
R3009	ERJ6GEYJ682V	RES M 6.8K-J-1/10W	
R3010	ERJ6GEYJ334V	RES M 330K-J-1/10W	
R3011	ERJ6GEYJ682V	RES M 6.8K-J-1/10W	
R3012	ERDS2TJ101T	RES C 100-J-1/4W	
R3013	ERJ6ENF75R0V	RES M 75.0-F-1/10W	
R3014	ERJ6ENF75R0V	RES M 75.0-F-1/10W	
R3015	ERJ6ENF75R0V	RES M 75.0-F-1/10W	
R3016	ERDS2TJ181T	RES C 180-J-1/4W	
R3017	ERDS2TJ181T	RES C 180-J-1/4W	
R3018	ERDS2TJ101T	RES C 100-J-1/4W	
R3019	ERJ6GEYJ682V	RES M 6.8K-J-1/10W	
R3020	ERJ6GEYJ682V	RES M 6.8K-J-1/10W	
R3021	ERDS2TJ101T	RES C 100-J-1/4W	
R3022	ERDS2TJ101T	RES C 100-J-1/4W	
R3023	ERDS2TJ101T	RES C 100-J-1/4W	
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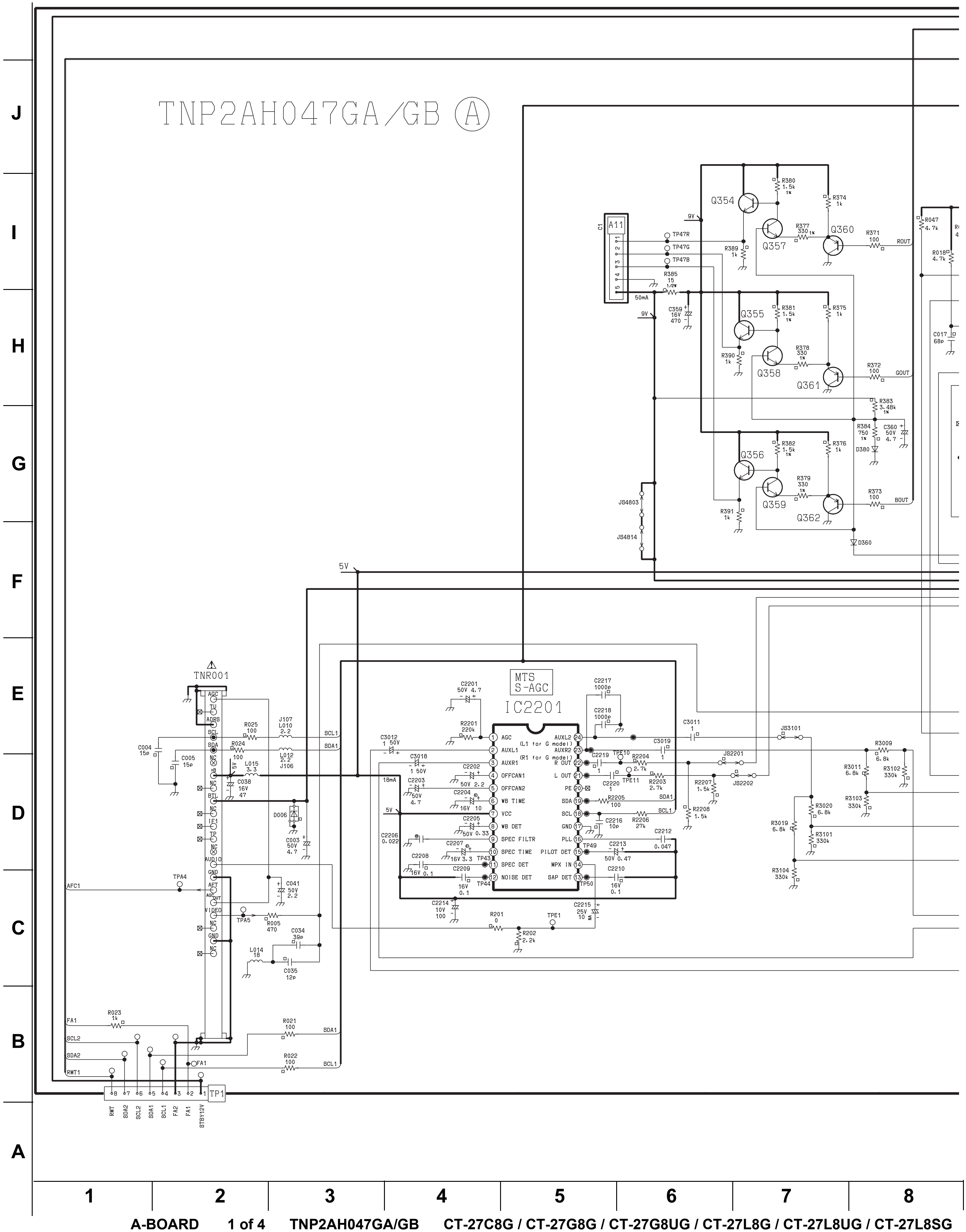
R3026	ERDS2TJ101T	RES C 100-J-1/4W	
R3027	ERDS2TJ101T	RES C 100-J-1/4W	
R3034	ERJ6GEYJ471V	RES M 470-J-1/10W	
R3035	ERJ6GEYJ562V	RES M 5.6K-J-1/10W	
R3036	ERJ6GEYJ183V	RES M 18K-J-1/10W	
R3037	ERJ6GEYJ471V	RES M 470-J-1/10W	
R3038	ERJ6GEYJ562V	RES M 5.6K-J-1/10W	
R3039	ERJ6GEYJ183V	RES M 18K-J-1/10W	
R3041	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R3042	ERJ6GEYJ472V	RES M 4.7K-J-1/10W	
R3101	ERJ6GEYJ334V	RES M 330K-J-1/10W	
R3102	ERJ6GEYJ334V	RES M 330K-J-1/10W	
R3103	ERJ6GEYJ334V	RES M 330K-J-1/10W	
R3104	ERJ6GEYJ334V	RES M 330K-J-1/10W	
SWITCHES			
S001	EVQPF106K	SWITCH	
S002	EVQPF106K	SWITCH	
S003	EVQPF106K	SWITCH	
S004	EVQPF106K	SWITCH	
S005	EVQPF106K	SWITCH	
S008	EVQPF106K	SWITCH	
S009	EVQPF106K	SWITCH	
TRANSFORMERS			
T501	ETH19Y211AZ	TRANSFORMER	
T551	KFT4AA348F2	TRANSFORMER FLYBACK	⚠

Ref. No.	Part No.	Part Name & Description	Remarks
T801	ETS35AA6B5NC	TRANSFORMER	⚠
T3001	TF0402B04P03	TRANSFORMER	
T3002	TF0402B04P03	TRANSFORMER	
		CRYSTALS/FILTERS	
X001	A1100005BD	CRYSTAL	
		OTHERS	
TNR001	ENG36621G	TUNER	⚠
M001	TSX2AA0361	AC LINE CORD	
M002	TMW2A97121	STRAIN RELIEF FOR AC CORD / CT-27G8G CT-27G8UG CT-27L8G CT-27L8UG CT-27L8SG	
M003	TJSC00300	CRT SOCKET	⚠
1	M68LGL061XA	27 INCH CRT	⚠
2	TLY2AA031	DEFLECTION YOKE	⚠
3	JH291U-009	PURITY AND CONVERGENCE RINGS	
4	TLK2AA0011	DEGAUSSING COIL	⚠
5	TXF3A011EV	DAG GND	
M004	TMM2A30702	YOKE WEDGE	
M005	0FMK014ZZ	CONVERGENCE CORRECTOR STRIP	
M006	TSN63115-4	PURITY MAGNET	
6	TXFKY10GSER	FRONT CABINET / CT-27L8G CT-27L8UG	
	TXFKY20GSER	FRONT CABINET / CT-27C8G	
	TXFKY21GSER	FRONT CABINET / CT-27L8SG	
7	TXFKU09GSER	BACK CABINET / CT-27G8G CT-27G8UG CT-27L8G CT-27L8UG CT-27L8SG	
	TXFKU01GSER	BACK CABINET / CT-27C8G	
8	TKX2AA00401	IR SENSOR GUIDE / CT-27G8G CT-27G8UG	
	TKX2AA00404	IR SENSOR GUIDE / CT-27L8G CT-27L8UG CT-27L8SG	
	TKX2AA00407	IR SENSOR GUIDE / CT-27C8G	
9	TAS2AA0029	1.5W 16-OHM SPEAKER	
10	TBX2AA0122	7-KEY BUTTON (GRAY) / CT-27L8G CT-27L8UG CT-27L8SG	
	TBX2AA1701GS	7-KEY BUTTON / CT-27G8G CT-27G8UG	
	TBX2AA2602	7-KEY BUTTON / CT-27C8G	
JK3001	TJB2AA0221	REAR A/V JACK / CT-27L8G CT-27L8UG CT-27L8SG CT-27C8G	
JK3001	TJB2A9064B	REAR A/V JACK / CT-27G8G CT-27G8UG	
JK3002	TJB2AA0046	FRONT A/V JACK	
JK3003	TJB2AA0421	TERMINAL S-VIDEO	
		OTHER ACCESSORIES	
M007	TQB2AA0461	OWNERS MANUAL	
M008	EUR7613Z10	REMOTE CONTROL / CT-27C8G	
M009	EUR7713010	REMOTE CONTROL / CT-27G8G CT-27G8UG CT-27L8G CT-27L8UG CT-27L8SG	
M010	UR76EC0303A	REMOTE CONTROL BATTERY COVER / CT-27C8G	
M011	UR77EC1303A	REMOTE CONTROL BATTERY COVER / CT-27G8G CT-27G8UG CT-27L8G CT-27L8UG CT-27L8SG	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AUXR1
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OFFCAN2
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VCC
WB DET
SPEC FILTR
SPEC TIME
SPEC DET
NOISE DET
AUXL2
AUXR2
R OUT
L OUT
PE
SDA
SCL
GND
PLL
PILOT DET
MPX IN
SAP DET
(L1 for G model)
(R1 for G model)
Q354
Q355
Q356
Q357
Q358
Q359
Q360
Q361
Q362
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GOUT
BOUT
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TP47G
TP47B
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SDA1
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FA2
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J106
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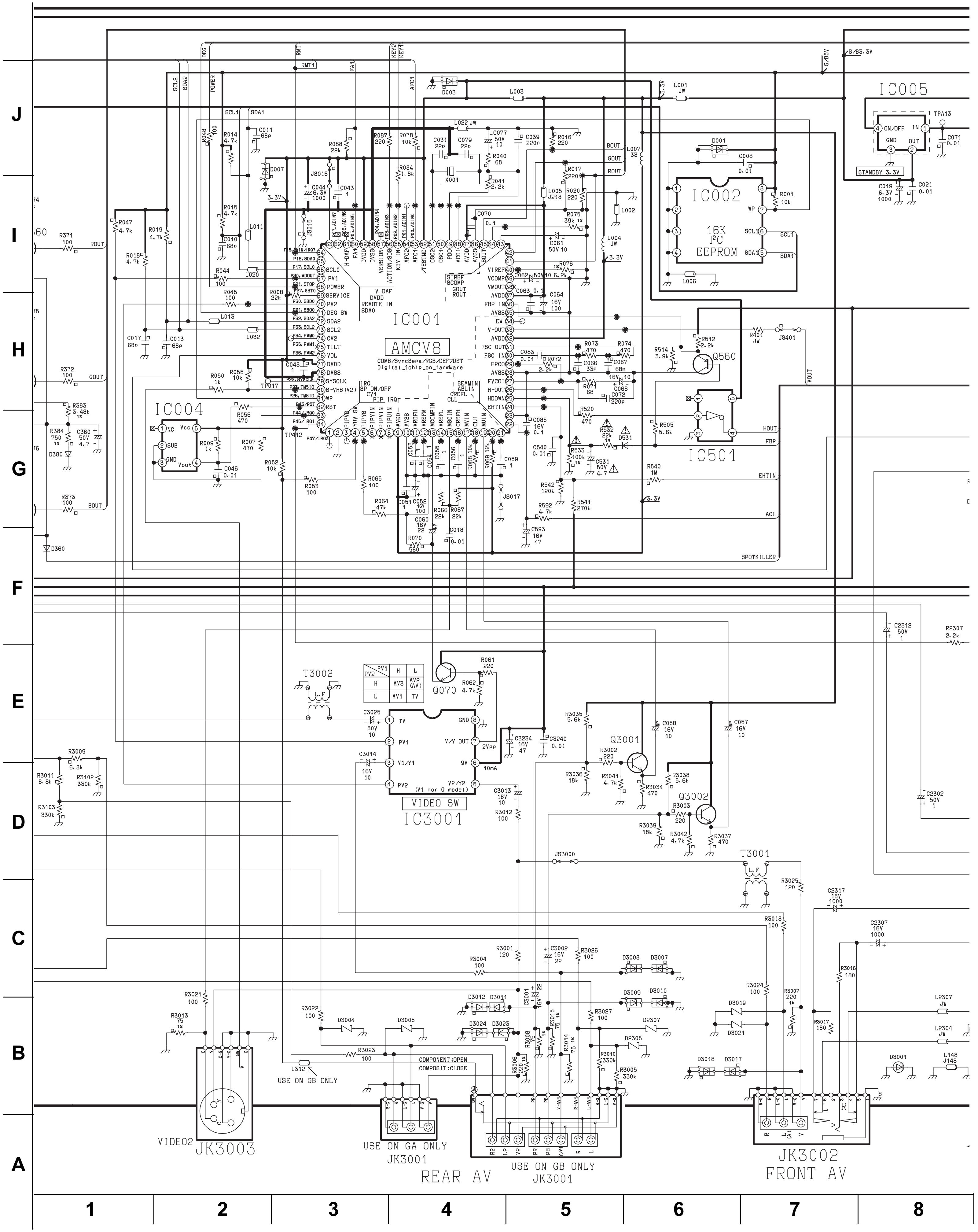
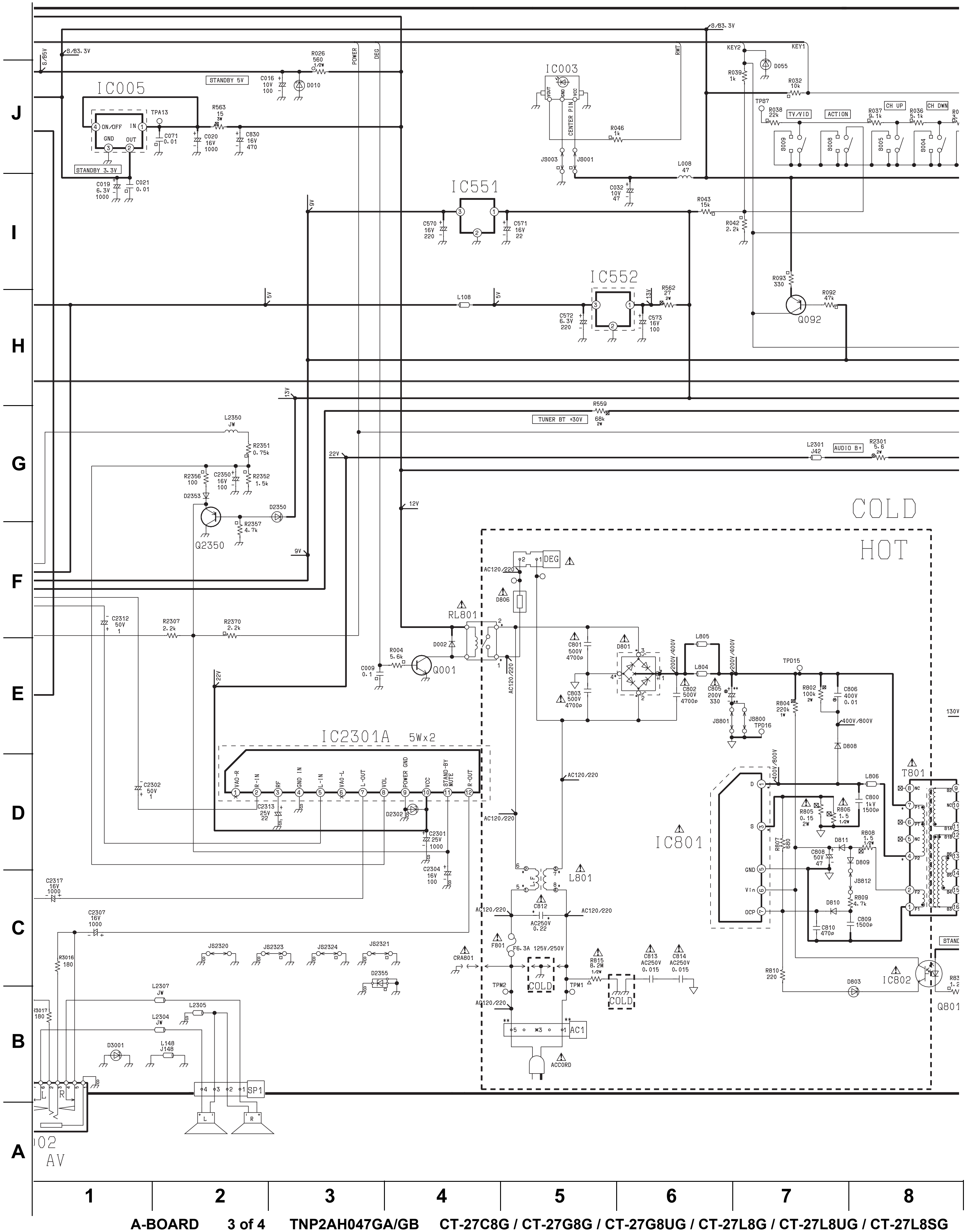


A-BOARD 2 of 4 TNP2AH047GA/GB CT-27C8G / CT-27G8G / CT-27G8UG / CT-27L8G / CT-27L8UG / CT-27L8SG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IC552
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IC801
IC802
COLD
HOT
RL801
L801
T801
Q001
Q092
Q2350
Q801
STANDBY 5V
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TV/VID
ACTION
CH UP
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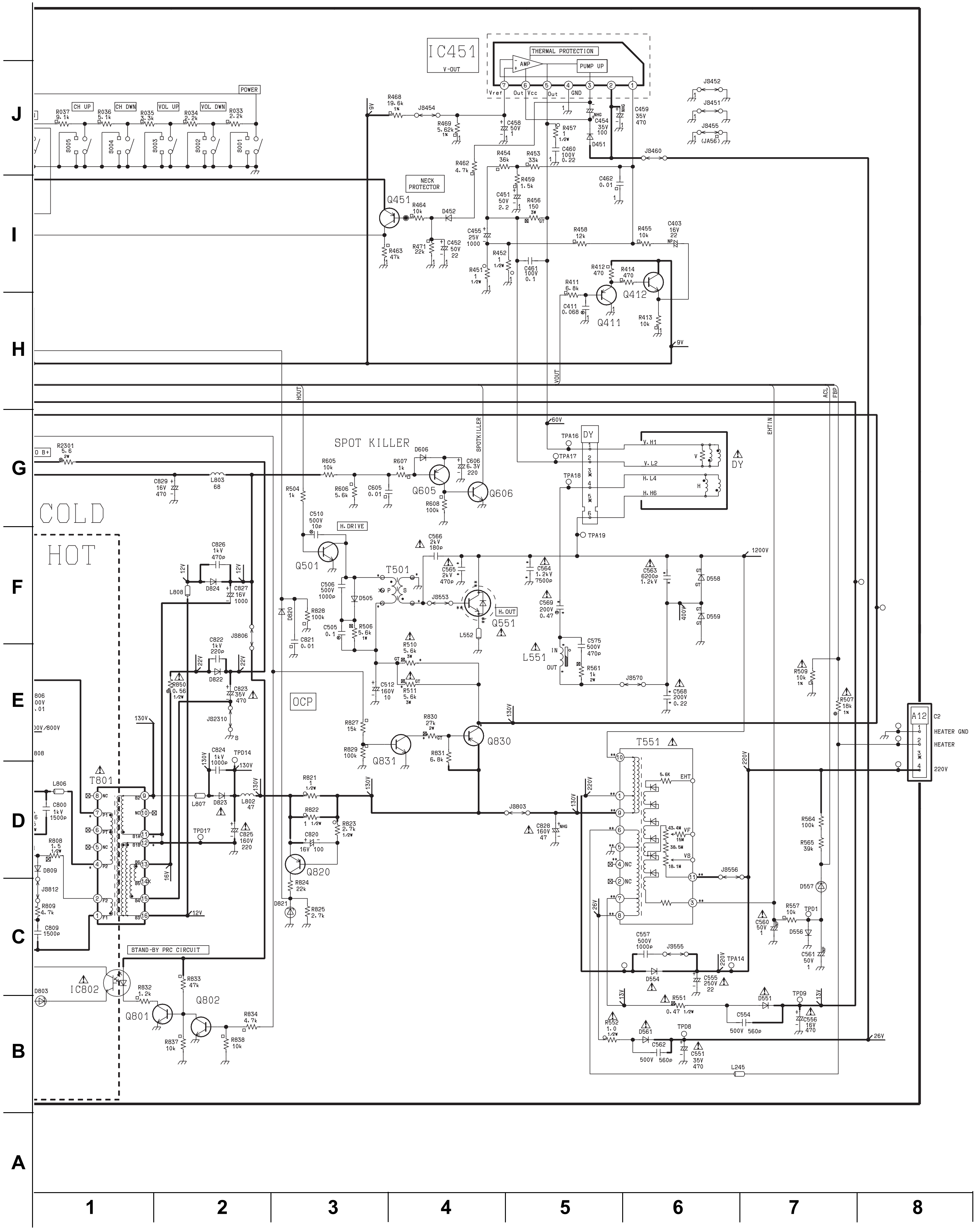
ACCORD
SP1
AV



A-BOARD 4 of 4 TNP2AH047GA/GB CT-27C8G / CT-27G8G / CT-27G8UG / CT-27L8G / CT-27L8UG / CT-27L8SG

A - BOARD

IC001

1	0.00	43	2.50
2	0.00	44	1.70
3	0.00	45	0.00
4	0.00	46	0.00
5	0.00	47	3.30
6	1.20	48	1.90
7	1.20	49	1.90
8	1.30	50	1.60
9	3.30	51	1.70
10	0.00	52	3.30
11	2.70	53	1.70
12	1.50	54	1.40
13	1.40	55	3.30
14	0.40	56	1.40
15	1.60	57	0.00
16	2.20	58	0.00
17	0.07	59	3.30
18	1.70	60	3.30
19	0.00	61	3.30
20	1.40	62	0.70
21	1.00	63	3.30
22	2.60	64	3.30
23	0.00	65	3.40
24	1.90	66	3.50
25	1.90	67	0.10
26	1.40	68	3.20
27	0.00	69	0.00
28	0.00	70	0.00
29	1.30	71	0.00
30	1.80	72	5.20
31	1.00	73	5.20
32	3.30	74	0.00
33	1.70	75	0.00
34	0.80	76	0.00
35	0.00	77	3.30
36	0.60	78	0.00
37	3.30	79	0.00
38	3.30	80	3.30
39	2.30	81	5.20
40	1.70	82	3.30
41	0.40	83	0.00
42	0.40	84	3.30

IC002

1	0.00
2	0.00
3	0.00
4	0.00
5	3.40
6	3.40
7	5.20
8	5.20

IC003

1	0.00
2	3.31
3	3.27

IC004

1	0.00
2	0.00
3	0.00
4	3.30
5	3.30

IC005

1	9.10
2	3.30
3	0.00
4	9.10

IC451

1	2.00
2	23.30
3	1.20
4	0.00
5	11.60
6	23.50
7	2.00

IC501

1	0.00
2	1.35
3	0.00
4	1.05
5	3.30

IC551

1	12.20
2	0.00
3	9.00

IC552

1	7.50
2	0.00
3	5.00

IC801↓

1	-21.00
2	N/A
3	0.10
4	N/A
5	0.00
6	32.24
7	1.50

IC802↓

1	2.30
2	32.24

IC2201

1	1.60	13	2.80
2	2.20	14	2.20
3	2.20	15	2.50
4	2.30	16	3.50
5	2.40	17	0.00
6	0.07	18	3.20
7	5.00	19	3.40
8	2.50	20	0.00
9	2.60	21	2.20
10	0.80	22	2.20
11	2.30	23	2.20
12	2.50	24	2.20

IC2301

1	6.40
2	5.60
3	16.80
4	0.00
5	5.60
6	6.30
7	8.60
8	0.00
9	0.00
10	18.30
11	3.10
12	8.70

IC3001

1	4.10
2	0.20
3	4.10
4	0.00
5	4.10
6	9.00
7	4.30
8	0.00

A - BOARD

	Q001	Q057	Q058	Q070	Q092	Q2350	Q3001	Q3002	Q354
B	0.00	1.50	1.50	4.12	8.90	5.35	1.30	1.30	4.50
C	13.00	0.00	0.00	8.90	1.40	0.00	3.30	3.30	8.50
E	0.00	0.07	0.07	3.50	3.30	3.14	0.70	0.70	3.80

	Q355	Q356	Q357	Q358	Q359	Q360	Q361	Q362	Q411
B	4.30	4.40	2.60	2.60	2.60	0.50	0.40	0.40	2.25
C	8.40	8.40	4.50	4.30	4.40	0.00	0.00	0.00	0.00
E	3.60	3.70	2.00	2.00	2.00	1.10	1.10	1.10	2.90

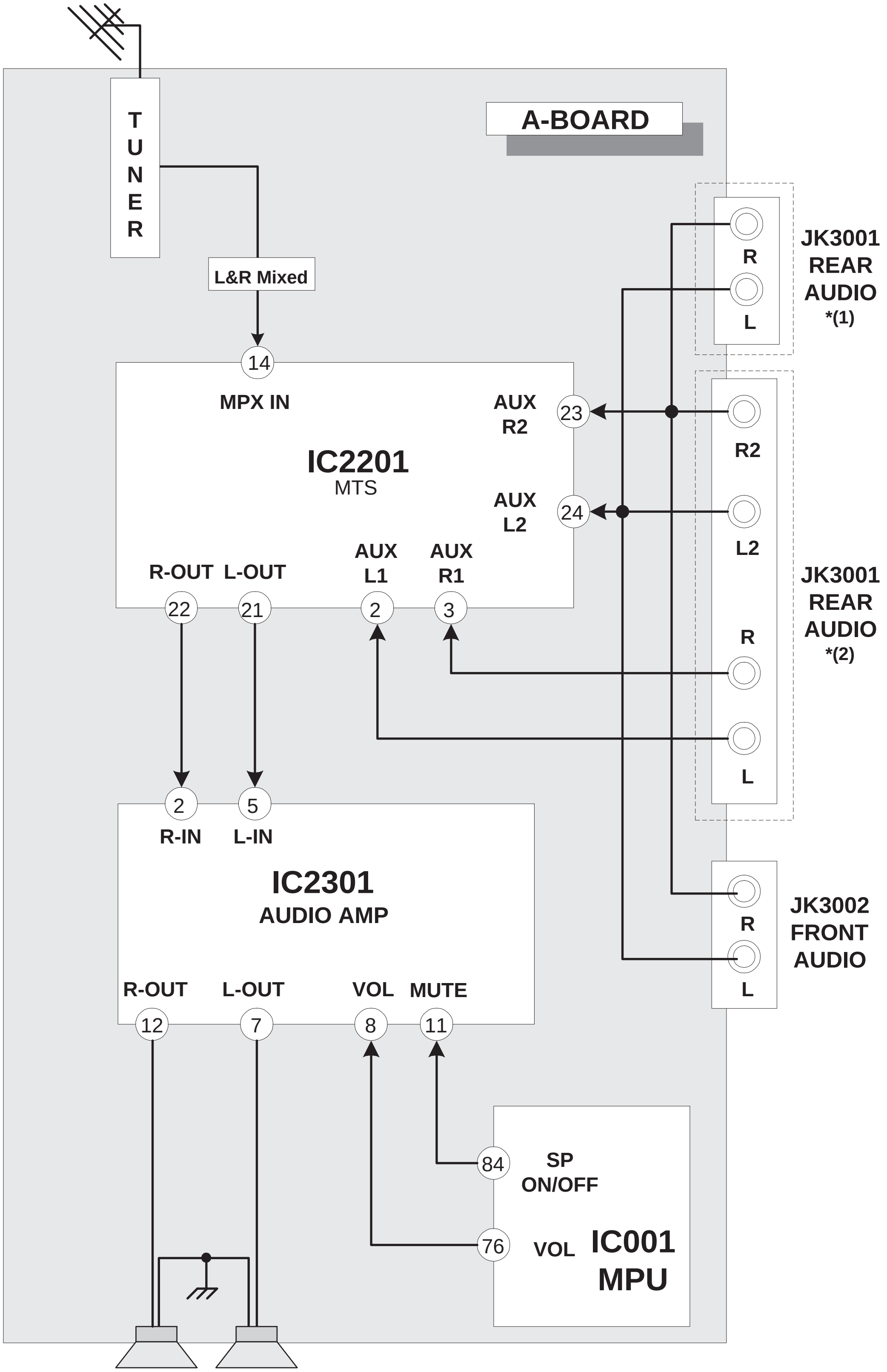
	Q412	Q451	Q501	Q551	Q560	Q605	Q606	Q801	Q802
B	2.90	5.10	0.40	0.00	0.30	4.80	0.00	0.00	0.70
C	9.00	1.40	56.80	14.70	0.00	0.00	3.30	12.52	0.00
E	2.40	3.30	0.00	0.00	0.60	4.70	0.00	0.00	0.00

	Q820	Q830	Q831
B	130.40	129.80	0.60
C	0.00	130.40	0.20
E	130.80	130.50	0.00

C - BOARD

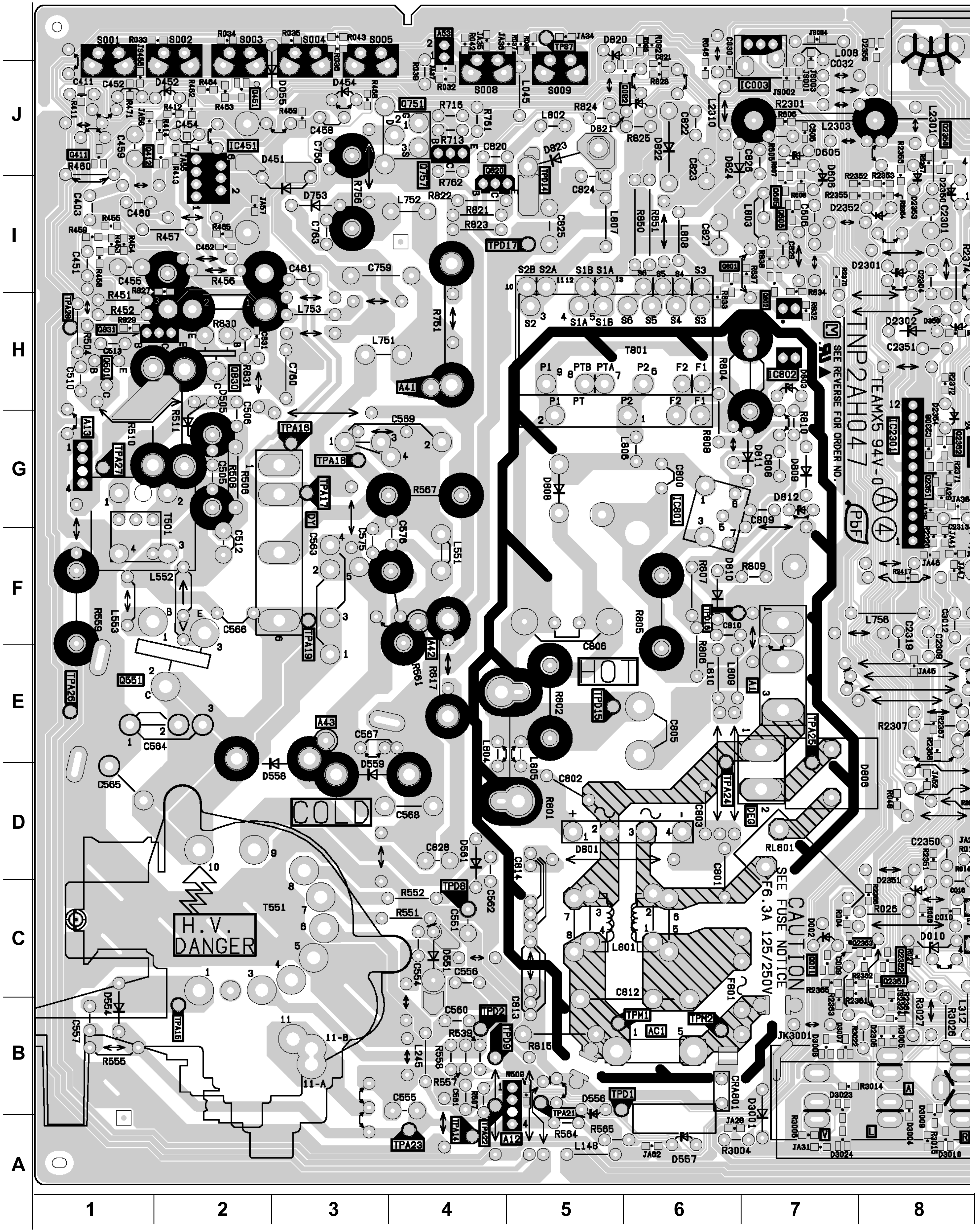
	Q351	Q352	Q353
B	3.90	3.80	4.00
C	163.00	165.30	160.20
E	3.60	3.60	3.70

Audio signal path block diagram



*(1) CT-27G8G / CT-27G8UG

*(2) CT-27C8G / CT-27L8G / CT-27L8UG / CT-27L8SG


HOT
COLD
H.V.
DANGER
CAUTION
SEE FUSE NOTICE
F6.3A 125/250V
TNP2AH047
TEAMX5 94V-0
SEE REVERSE FOR ORDER NO.
PbF
T801
T551
T501
RL801
L801
F801
D801
IC801
IC802
IC451
IC2301
IC003
1
2
3
4
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8
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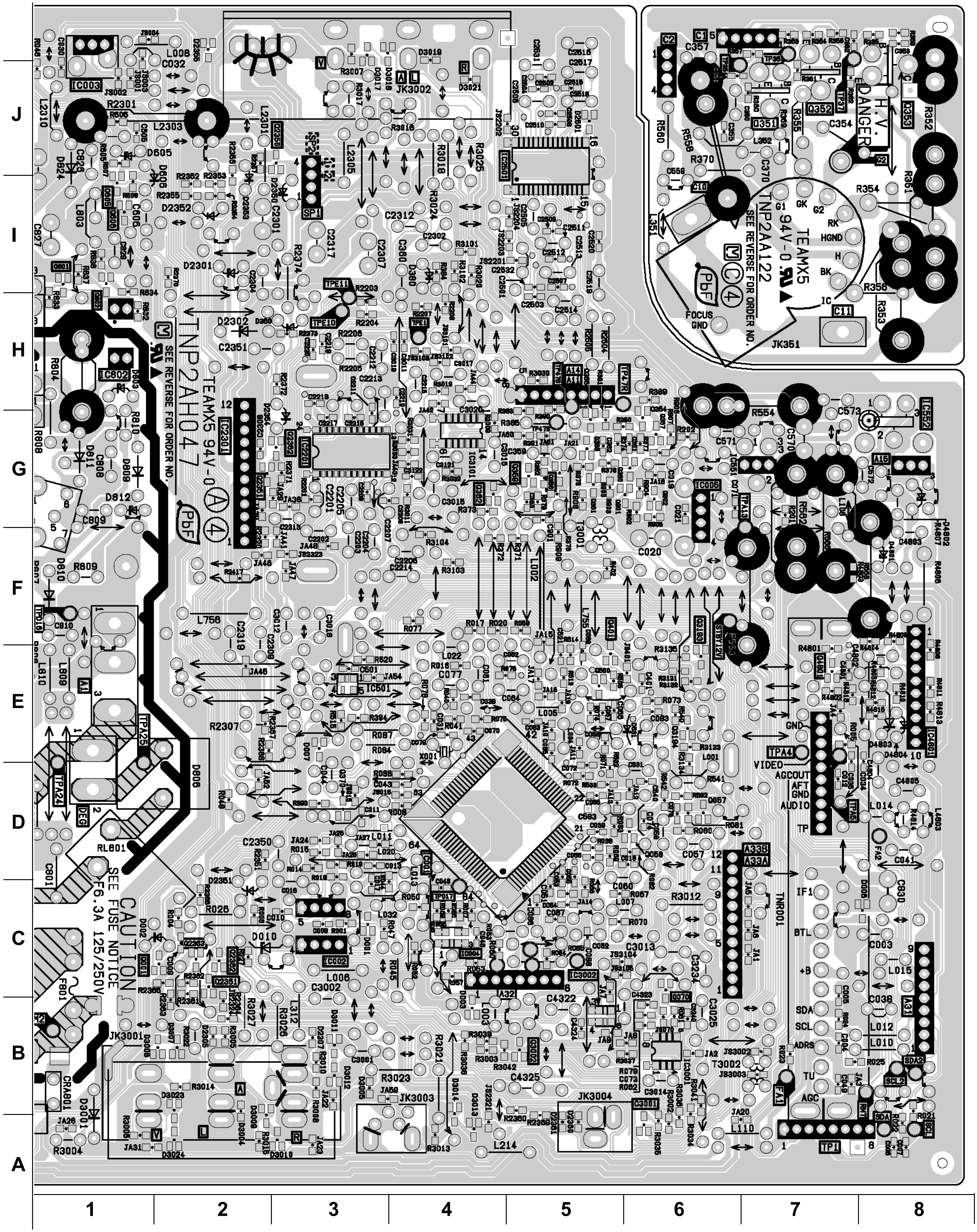
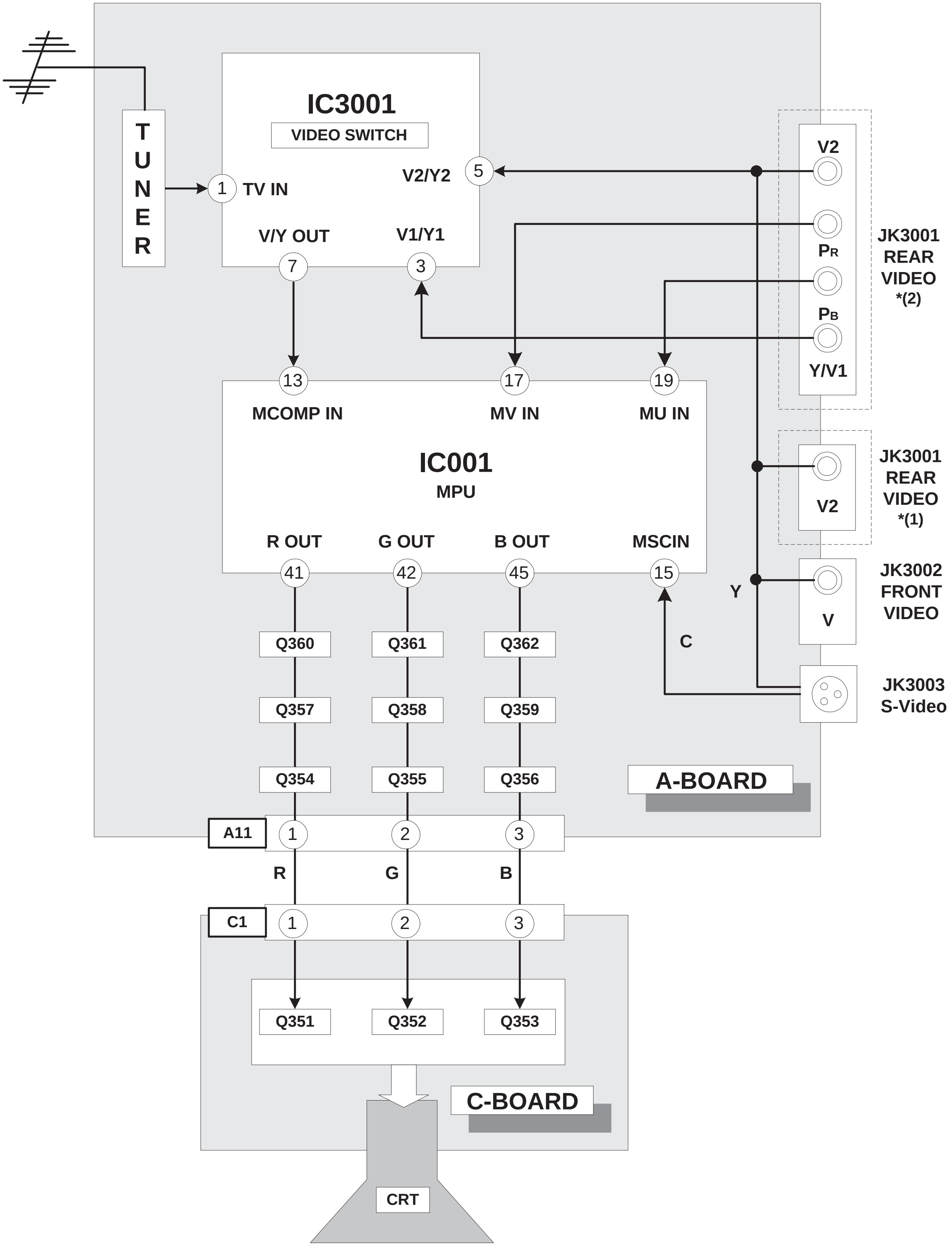
B
C
D
E
F
G
H
I
J



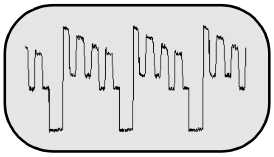
Video signal path block diagram



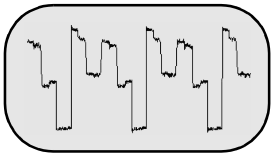
*(1) CT-27G8G / CT-27G8UG

*(2) CT-27C8G / CT-27L8G / CT-27L8UG / CT-27L8SG

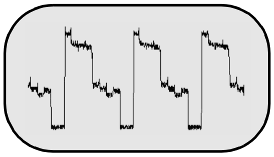
A-Board



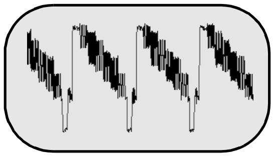
① **4 Vp-p**
A11 PIN 3 (BLUE OUT)



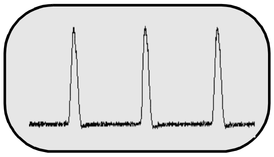
② **4 Vp-p**
A11 PIN 1 (RED OUT)



③ **4.32 V-p**
A11 PIN 2 (GREEN OUT)



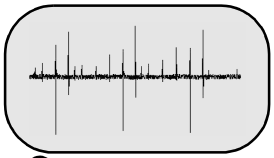
④ **1.3 Vp-p**
TPA5 (VIDEO)



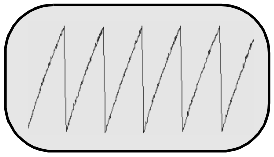
⑤ **3.28 Vp-p**
IC001 PIN 36 (FBP IN)

10MHz X'tal

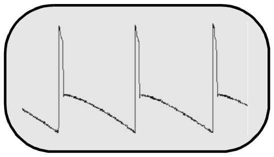
⑥
IC001 PIN 50 (OSC)



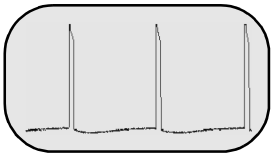
⑦ **600mv Vp-p**
IC451 PIN 1 (VERT IN)



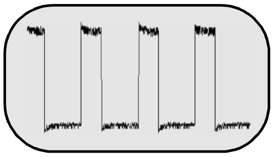
⑧ **1.88 Vp-p**
Q4111 B (V DRIVE)



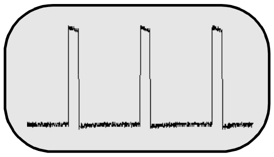
⑨ **58.0 Vp-p**
IC451 PIN 5(V OUT)



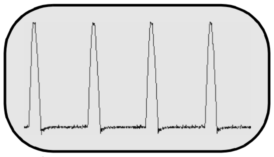
⑩ **30.4 Vp-p**
IC451 PIN 3 (PUMP UP)



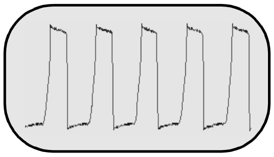
⑪ **3.4 Vp-p**
IC501 PIN 4 (H-DRIVE)



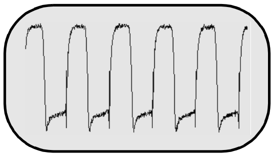
⑫ **111 Vp-p**
A12 PIN 2 (HEATER)



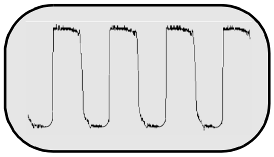
⑬ **1.29 kVp-p**
Q551 Collector (H OUT)



⑭ **398 Vp-p**
IC801 PIN 1



⑮ **2.92 Vp-p**
IC801 PIN 7



⑯ **121 Vp-p**
Q501 Collector